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# **EVALUATION AND REVISION OF A TINNITUS BROCHURE**

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A thesis submitted in partial fulfilment of the requirements for  
the Degree of Master of Audiology  
in the Department of Communication Disorders  
at the University of Canterbury

2016

## ACKNOWLEDGEMENTS

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I am incredibly grateful to my supervisor, Dr Rebecca Kelly-Campbell, for her guidance and support throughout the entire MAud course. This thesis would not have been possible without you. Thank you for sharing your vast knowledge and for your endless patience. You truly go above and beyond for your students.

I express my sincere thanks to my co-supervisor, Katrin Wendel, for providing valuable insight and for making this study possible. I would also like to thank the participants who gave their time to be a part of this study and provided constructive feedback.

Thank you to my family and friends for your never-ending support and encouragement. A special thank you to Jodi for being so thoughtful and giving; you were my sunshine in Christchurch. Finally, thank you, Steve, for believing in me and providing me with endless love.

## ABSTRACT

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**Aims:** The purpose of this study was to evaluate and revise a tinnitus brochure, with the goal being that the revised material show improvement. The evaluation phase of this study aimed to answer two research questions: a) What is the reading grade level (RGL) of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic? b) What is the suitability of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic? The revision phase of this study aimed to address the following hypotheses: a) The revised tinnitus brochure will have a readability level no greater than the sixth RGL. b) The revised tinnitus brochure will have a Suitability Assessment of Materials (SAM) score > 39%. c) Participants will indicate that the revised brochure does not require further revision.

**Method:** To address the first aim, a tinnitus brochure was evaluated in terms of readability and suitability, using standardised measures. The brochure was further evaluated using learner verification, whereby a group of participants who experience tinnitus were interviewed about the material. To address the second aim, the brochure underwent a revision process to achieve adequate readability and suitability, while observing best practice guidelines and taking into account participants' opinions. Following revision, the same participants were interviewed a second time about the revised material.

**Results:** Readability and suitability results indicated that the brochure was difficult to read and was not suitable for its intended audience. Participants provided several suggestions for improvement during the first interview session, from which the author identified eight general themes with 16 sub-topics. Post-revision analysis demonstrated that the revised brochure showed improved readability and suitability. At the second interview session, participants endorsed the revised brochure.

***Conclusion:*** It is important to provide tinnitus sufferers with information that is easily understood, has clear purpose, and presents low-cost strategies. Clinicians can assess the materials they provide to patients and engage in revision using best-practice guidelines for improving readability and suitability. When tinnitus patients are given high-quality information about tinnitus, they have a better chance at improved health outcomes.



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## LIST OF ABBREVIATIONS

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BEPTA	Pure tone average of the better ear
dB HL	Decibel hearing level
F-K	Flesch-Kincaid Grade Level Formula
FOG	Gunning's Fog Index Readability Formula
FRE	Flesch Reading Ease Score
Fry	Fry Readability Graph
RGL	Reading Grade Level
SAM	Suitability Assessment of Materials
SMOG	Simple Measure of Gobbledygook
SOAEs	Spontaneous Otoacoustic Emissions
WEPTA	Pure tone average of the worse ear
WHO	World Health Organisation

# CHAPTER ONE: INTRODUCTION

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## 1.1 Overview

Tinnitus, or ringing in the ears, can be a bothersome condition for those who experience it. Although not every person with tinnitus will need clinical intervention, some will seek out information and support from a healthcare provider. While there is no known cure for tinnitus, finding ways to manage the condition has been a widespread endeavour. Counselling is a practice used by clinicians to help manage tinnitus perception and reaction (Bauer & Brozowski, 2011; Folmer et al., 2004). In addition to counselling, clinicians may provide printed patient education materials to communicate health information (McFerran & Phillips, 2007; Tunkel et al., 2014).

While providing printed materials can be an effective teaching tool (Shieh & Hosei, 2008), few health professionals are trained in writing them (Hoffmann & Worrall, 2004). There is an emerging body of research aimed at evaluating printed health materials within the scope of audiology, and findings indicate that the majority of materials could be improved (Atcherson, Zraick, & Brasseux, 2011; Caposecco, Hickson, & Meyer, 2014; Joubert & Githinji, 2014). Because tinnitus is relatively prevalent, it is important that clinicians have high quality information to give people who enquire about the condition. Furthermore, many people have difficulty understanding patient education materials and making health-related decisions, a predicament known as low health literacy. In New Zealand, an estimated 56% of adults have low health literacy skills (Ministry of Health, 2010), and other data show that functional literacy skills range from 7% to 47% in developed countries (Nutbeam, 2008). It has been widely recommended that printed materials be written at or below the sixth grade reading level (National Library of Medicine, 2013), yet many are written at a much higher level (Cotugna, Vickery, & Carpenter-Haeefe, 2005; Hill-Briggs & Smith, 2008; Shieh &

Hosei, 2008; Vallance, Taylor, & Lavalley, 2008). As a result, patient education materials are not as effective as they could be (Hill-Briggs & Smith, 2008; Shieh & Hosei, 2008). Hence, the aim of this thesis is to evaluate and revise a tinnitus brochure to make it more useful for the intended audience.

This chapter will provide an introduction to tinnitus, including causes, prevalence, effects on quality of life, and treatment options. The focus will then move to patient education as it pertains to tinnitus patients, followed by a discussion on health literacy. Next, the concepts of readability and suitability will be explained before reviewing best practice guidelines for improving patient education materials. Finally, the rationale behind this thesis will be put forward before outlining the specific aims and hypotheses of the study.

## **1.2 Tinnitus**

Tinnitus is the perception of sound in the head and/or ears in the absence of a stimulus (Holmes & Padgham, 2008; Tunkel et al., 2014). Tinnitus may take many forms, but has been frequently described as buzzing, ringing, roaring, clicking or hissing (Baguley, McFerran, & Hall, 2013; Tunkel et al., 2014). In addition to sound quality, tinnitus may be depicted in terms of pitch, loudness, and temporal features (Henry, Roberts, Caspary, Theodoroff, & Salvi, 2014). The sounds may occur in one or both ears, and be constant or intermittent. For some individuals, tinnitus is only heard in quiet settings, whereas others may perceive it constantly and find it extremely bothersome (Henry et al., 2014).

In common medical terminology, tinnitus is not defined as an illness, but is considered a symptom (Appelqvist et al., 2001; Holmes & Padgham, 2008). Tyler (2000), however, dislikes the term “symptom” because it is not broad enough to encompass the impact tinnitus can have on a person’s quality of life. The effect of tinnitus on a person’s well-being depends not only on the severity of tinnitus, but on the person’s reaction to the condition.



### **1.2.1 Classification and aetiology**

Tinnitus is generally classified into two types: objective and subjective. Objective tinnitus is rare, accounting for less than 1% of all cases, and occurs when an outside observer can hear the sounds that the affected person is experiencing (Baguley et al., 2013; Folmer, Martin, & Shi, 2004). Objective tinnitus can be categorised as pulsatile or nonpulsatile. Nonpulsating objective tinnitus may be of middle ear origin or spontaneous otoacoustic emissions (SOAEs) arising within the sensorineural system (Tyler, 2000). Pulsatile tinnitus may indicate vascular lesions or other abnormalities such as neoplasm, benign intracranial hypertension, or high cardiac input (Folmer et al, 2004; Tyler, 2000).

More commonly, tinnitus is subjective, meaning only the affected person hears the sounds (Baguley et al., 2013; Folmer et al, 2004; Tyler, 2000). Subjective tinnitus typically occurs in association with hearing loss (Henry et al., 2014; Savastano, 2008). A study by Hesse and Laubert (as cited in Hesse, Schaaf, & Laubert, 2005) found that inner ear dysfunction is present in over 90% of tinnitus patients. Interestingly, degree of hearing loss does not correlate with tinnitus severity, so tinnitus is not simply a consequence of hearing loss (Baldo, Doree, Molin, McFerran, & Cecco, 2012). There is also evidence that tinnitus may occur without auditory impairment (Luxon, 1993; Seidman, Standring, & Dornhoffer, 2010). Some researchers argue that tinnitus cannot occur without hearing loss, and that existing hearing loss is simply unidentified due to poor audiometric resolution or failing to test ultra-high frequencies (Searchfield, Jerram, Wise, & Raymond, 2007).

According to Folmer and colleagues (2004), exposure to loud sounds is the most common cause of subjective tinnitus. Excessively loud sounds damage the hair cells in the cochlea, which can result in ringing in the ears (Folmer et al., 2004; Meecham & Hume, 2001). Many people experience this type of tinnitus temporarily after attending a night club or concert (Appelqvist et al, 2001; Saunders & Griest, 2009). Tinnitus that lasts for only a matter

of days is known as acute tinnitus, while tinnitus that persists for six months or more is considered chronic tinnitus (Folmer et al., 2004). Long-term noise exposure, which often leads to noise-induced hearing loss, is an important risk factor for developing chronic tinnitus (Eggermont & Zeng, 2012).

Ototoxicity is another common cause of tinnitus. Salicylate (aspirin) and quinine (used to prevent malaria) are known to induce a reversible bout of tinnitus (Lobarinas et al., 2006; Ralli et al., 2010). Aminoglycoside antibiotics, chemotherapeutic agents, loop diuretics, and other medications are also associated with tinnitus (Sismanis, 2001). In their study comparing tinnitus onset rates of chemotherapeutic agents and ototoxic antibiotics, Dille and colleagues (2010) found that cisplatin and carboplatin (both chemotherapeutic agents) are the most potent tinnitus-inducing drugs.

Besides noise exposure and ototoxicity, subjective tinnitus has a wide variety of possible causes, ranging from minor to life-threatening. These can include impacted cerumen, fever, middle ear disease, head injury, Meniere's disease, cerebellopontine angle tumours, and temporal bone neoplasm (Eggermont & Roberts, 2004; Folmer et al., 2004; Henry et al., 2014). In many cases, the origin of tinnitus is idiopathic (Tyler, 2000), with 40% of patients reporting no known events associated with the onset of their tinnitus (Meikle & Griest, 1989).

Despite the fact that subjective tinnitus cannot be heard by others and may have an unknown cause, it is important that tinnitus is acknowledged as a true sensation (Appelqvist et al., 2001). Hereafter, the term "tinnitus" will refer to subjective tinnitus unless otherwise specified.

### **1.2.2 Mechanisms**

The exact causal mechanisms of tinnitus are unclear, although many theories exist (Baguley, 2002; Baldo et al., 2012; Crummer & Hassan, 2004). Tinnitus may originate anywhere along the auditory pathway (Crummer & Hassan, 2004), and almost any disorder

involving the ear may be associated with tinnitus (Andersson, 2002). For many years, it was assumed that the ear was the mechanism for tinnitus generation. Then in the 1970s and 1980s, evidence emerged showing that transection of the auditory nerve did not always eliminate tinnitus (Fisch, 1970; Pulec, 1984), and sometimes even worsened the condition (Gardner, 1984; House & Brackman, 1981). These findings suggested that tinnitus could be generated centrally.

Such findings sparked a surge in experimental animal studies, mostly using rodents that were conditioned to signal the presence of tinnitus (Eggermont & Roberts, 2004). Early studies using rats with drug-induced acute tinnitus demonstrated that animals can experience tinnitus, and that it is associated with neural activity in the central auditory system (Chen & Jastreboff, 1995; Jastreboff, Brennan, Coleman, & Sasaki, 1988). Further research using animals suffering from noise-induced chronic tinnitus suggested the presence of tinnitus in the absence of hearing loss (Heffner & Harrington, 2002) or with only minor hearing loss (Seki & Eggermont, 2003).

It is now generally accepted that tinnitus is predominantly generated centrally, although there is no consensus regarding the specific mechanisms involved (Auerbach, Rodrigues, & Salvi, 2014; Roberts et al., 2010). Many researchers have proposed theories based on neurophysiological models of tinnitus (Auerbach et al., 2014). Some believe that tinnitus may be due to hyperactive spontaneous activity in the central auditory system, i.e., an increased firing rate of neurons in the absence of sensory input (Baguley, 2013; Kaltenbach, 2000). Other researchers propose that abnormal synchrony and temporal coherence may cause some forms of tinnitus (Eggermont, 2007; Møller, 2010a). Another hypothesis is that sensory deprivation or overstimulation of the auditory nervous system, which leads to neural plasticity, may cause tinnitus (Eggermont & Roberts, 2004; Møller, 2010a; Salvi, Wang, & Ding, 2000).

Other tinnitus models emphasise the role of emotional, cognitive, and psychophysiological factors (Heinecke, Weise, Schwarz, & Rief, 2008). Brain areas such as the limbic system, which controls basic emotions, are thought to play a role in chronic tinnitus (Heinecke et al., 2008; Rauschecker, Leaver, & Mühlau, 2010). In support of this theory, human brain imaging studies demonstrate changes to limbic structures in tinnitus patients (Adjamian, Sereda, & Hall, 2009; Lockwood et al., 2001). Some researchers suggest that people become aware of their tinnitus only after abnormal neural activity in the primary sensory cortex is connected to the frontal, parietal, and limbic brain regions (De Ridder, Elgoyhen, Romo, & Langguth, 2011). In essence, tinnitus sufferers are unable to habituate to their tinnitus, due to constantly worrying about its presence and the negative emotional reactions associated with its sound (Heinecke et al., 2008). De Ridder and colleagues (2011) believe that tinnitus is a state of continuous learning, where the connection to negative emotions is continuously reinforced.

At present, no single underlying mechanism has been identified as the primary generator of tinnitus. It is likely that multiple generators are involved, located in both the peripheral and central regions of the auditory system (Georgiewa et al., 2006). As stated by Georgiewa and colleagues (2006), a phenomenon as complex as tinnitus could hardly be expected to have simple origins.

### **1.2.3 Prevalence**

Nearly everyone experiences a brief episode of tinnitus from time to time (Eggermont & Zeng, 2012). Ringing in the ears commonly occurs after attending a concert, for example, and may last for a day or two. Many epidemiologic studies have been carried out to determine how many people experience chronic tinnitus. Results indicate that tinnitus affects an estimated 10% to 15% of adults worldwide (Baguley et al., 2013; Henry, Dennis, & Schechter, 2005; Tunkel et al., 2014). Exact figures fluctuate across studies because different

criteria are used to define tinnitus, and studies often use participants who have sought help for their tinnitus (Møller, 2010b).

New Zealand data were obtained via questionnaire in a longitudinal study based in Dunedin. Welch and Dawes (2008) asked 970 participants in their early thirties about any tinnitus experiences in the preceding year. Results indicated that 38% of the participants experienced tinnitus rarely, while 7% experienced tinnitus at least half the time. Those who experienced tinnitus more frequently found it more annoying than those who experienced tinnitus only occasionally.

While epidemiologic reports vary, researchers tend to agree that the incidence of tinnitus increases with age (Heller, 2003; Nondahl et al., 2002; Tyler, 2000). In their seminal study of tinnitus characteristics and prevalence, Sindhusake et al. (2003) found that tinnitus was reported by 30% of people over the age of 55. Hearing loss due to ageing, known as presbycusis, is widespread among elderly people (Gates & Mills, 2005). It is unsurprising that tinnitus is more common in the ageing population considering that the prevalence of tinnitus is three times higher in people with hearing loss (Tyler, 2000). Furthermore, research indicates that tinnitus is frequently comorbid with hyperacusis (Eggermont & Zeng, 2012), which is defined as an unusual intolerance to every day sounds (Vernon, 1987). In their study investigating the relationship between hyperacusis and tinnitus, Douman and Bouscau-Faure (2005) estimate that 79% of tinnitus sufferers also experience hyperacusis.

Many people who experience tinnitus are able to live with the condition without significant impact on their daily life (Baguley et al., 2013). For some, however, the effect is more serious. Of those who experience tinnitus, 20% manifest a clinically significant condition (Davis & Refaie, 2000; Tunkel et al., 2014) and approximately 10% find the sensation distressing (Sindhusake et al., 2003). A further 1-2% of tinnitus sufferers are

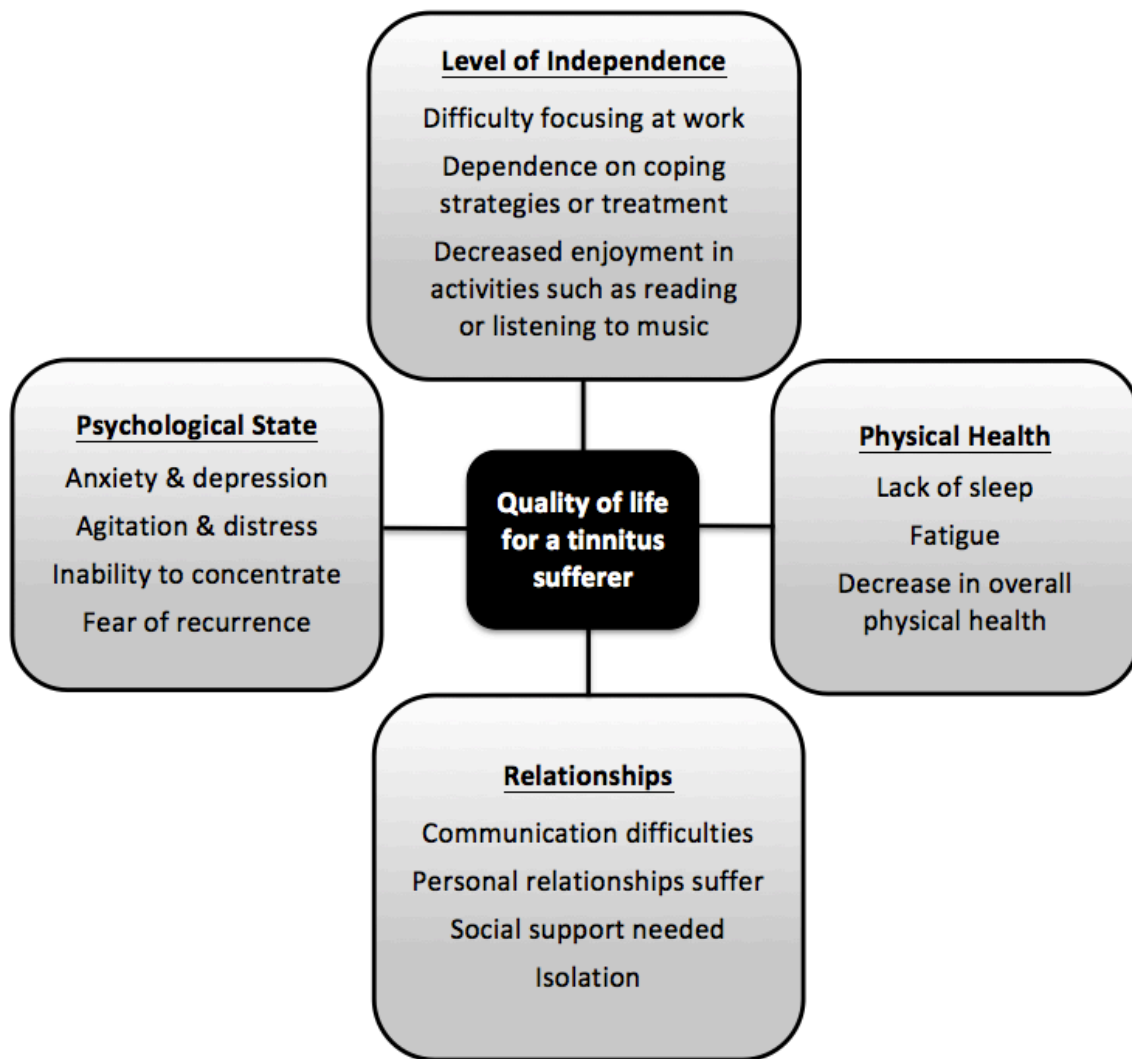
severely affected by the condition, with significant implications for their quality of life (Heller, 2003).

#### **1.2.4 Effect on quality of life**

According to the World Health Organization (1993), quality of life is a broad concept defined as “an individual’s perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns” (p. 153). Quality of life is affected by several factors, including physical health, psychological state, level of independence, and relationships (WHO, 1993). Quality of life reflects an individual’s ability to function; when a person suffers from a condition such as tinnitus, the effect on quality of life may also reflect the person’s inherent ability to cope with the condition (Kennedy, Wilson, & Stephens, 2004). Figure 1 shows an example of how a person suffering from tinnitus might integrate with the WHO’s quality of life model. Findings from Wilson, Lewis and Stephens (2002) suggest that tinnitus sufferers perceive themselves to have poorer health and a lower quality of life than the general population. In a related study, Carpenter-Thompson, McAulet, and Husain (2015) used an online survey to collect data from over 600 individuals with tinnitus, and found that as quality of life increased, tinnitus severity decreased.

#### **1.2.5 Psychological factors**

Tinnitus perception varies dramatically across individuals, and the impact of tinnitus depends on numerous factors. Such factors may include coping strategies and present stress levels (Georgiewa et al., 2006), as well as personality type and predisposition to anxiety and depression (Langguth et al., 2007). It is not tinnitus *per se* that becomes the problem, but an individual’s reactions to tinnitus that can impact daily life (Henry et al., 2005).



**Figure 1.** Quality of life conceptual model applied to tinnitus sufferers (adapted from Ferrell et al. as cited in Chopra & Kamal, 2012, p.3).

Tinnitus severity and a person's reaction to tinnitus may be influenced by psychological factors such as personality and state of mind (Belli, Belli, Oktay, & Ural, 2012; Henry et al., 2005). This is part of the reason why some individuals are not bothered by their tinnitus while others find it debilitating (Milerová et al., 2013; Tyler & Baker, 1983). In their study investigating tinnitus and personality characteristics, Weber, Jagsch, and Halls (2008) found a significant relationship between tinnitus severity and being impulsive, emotional, and worried about health. A New Zealand study by Welch and Dawes (2008) found that tinnitus sufferers tend to be more socially withdrawn, reactive to stress, and less self controlled. An

individual with such personality traits, or in a worrisome state of mind, may focus more on the presence of tinnitus, causing the phantom sounds to become more audible and intrusive (Henry et al., 2005). Some tinnitus sufferers may feel that they lose part of their identity, since they can no longer engage in activities they used to enjoy, such as reading or listening to music (Tyler, 2000).

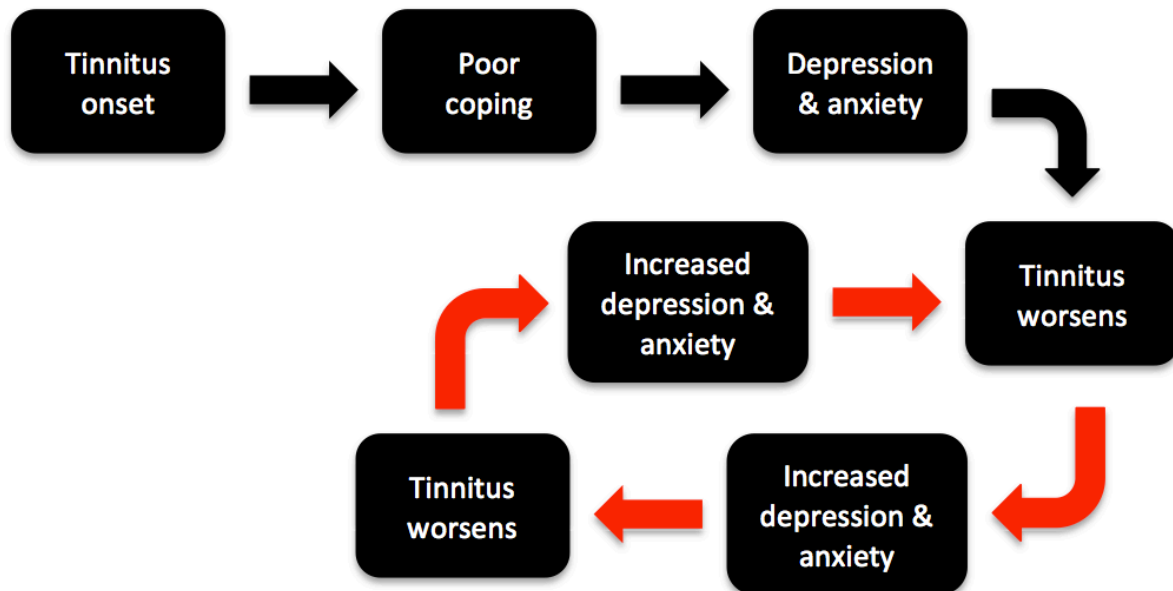
Tinnitus patients may present with depression, anxiety, emotional distress, and difficulties concentrating or sleeping (Folmer & Greist, 2000; McKenna, Hallam, & Hinchcliff, 1991; Tyler & Baker, 1983). Tinnitus may produce feelings of anger or tension, and in rare cases, lead to severe depression or even suicide (Appelqvist et al., 2006). In a study exploring psychiatric symptoms and comorbidities in tinnitus patients, Belli and colleagues (2008) showed that more than a quarter of patients had at least one psychiatric diagnosis, with anxious and depressive symptoms being the most common.

Many tinnitus patients report that stress levels affect their tinnitus, noting that their tinnitus becomes louder during stressful periods (Tyler, 2000). Research supports these claims, with studies indicating that stress can exacerbate tinnitus (Hébert & Lupien, 2007; Sahley & Nodar, 2001). This phenomenon, in combination with psychological factors described above, can lead to a vicious cycle where stress and anxiety increase tinnitus, leading to greater anxiety, and therefore increased tinnitus, and so on (Figure 2).

Unfortunately, there is no known cure for tinnitus. Folmer et al. (2004) compare chronic tinnitus to chronic pain, to the extent that treatment is focused on managing the condition rather than providing a cure. While some who are bothered by their tinnitus may habituate to its presence, many individuals require therapeutic intervention to help alleviate the complaint (Kennedy et al., 2004). The ultimate goal of treatment is to reduce the impact of tinnitus on a person's life (Henry et al., 2005). This can be achieved by teaching patients to



manage their reaction to tinnitus, thereby improving their quality of life (Jastreboff, 2012).



### 1.2.6 Management

There have been numerous trials to test the efficacy of drug treatment for tinnitus. Many trials have been criticised for insufficient design measures, and randomized controlled trials often produce strong placebo effects (Lockwood, Salvi, & Burkard, 2002). Some pharmacological interventions include cortisone, benzodiazepines, and antidepressants

(Martinez-Devesa, Perera, Theodoulou, & Waddell, 2010). In their review of six studies involving 610 tinnitus patients, Baldo and colleagues (2012) conclude that there is insufficient evidence to prove that antidepressants are effective in managing tinnitus. Some alternative medicines, such as Ginkgo biloba extract, have been thought to reduce tinnitus, but evidence is scant. In a systematic review evaluating four studies with over 1500 participants in total, it was concluded that there is no evidence to support that Ginkgo biloba extract is effective in treating tinnitus (Hilton, Zimmermann, & Hunt, 2013).

Abundant evidence suggests that therapy may be useful in managing tinnitus. One type of therapy, known as cognitive behavioural therapy (CBT), focuses on changing an individual's attitude toward tinnitus to reduce associated stress (Jun & Park, 2013). The technique was originally developed for treating depression and anxiety, and involves relaxation and cognitive restructuring to transform negative thoughts into more helpful thoughts (Martinez-Devesa et al., 2010; Tunkel et al., 2014). For example, a tinnitus patient may think she does not want to meet her son for coffee, because she won't enjoy herself due to her tinnitus interfering with conversation. As a result, the patient might feel sad that she did not see her son. With CBT, the patient would identify negative thoughts and restructure them into alternative thoughts such as: "Even though I cannot hear well over my tinnitus, I will still enjoy seeing my son and the atmosphere of the café." Her new behaviour would be going to meet her son, and her new outcome would be enjoying the interaction and atmosphere (adapted from Tunkel et al., 2014). In their review of eight studies employing CBT, Martinez-Devesa et al. (2010) found that CBT is not effective for reducing the subjective loudness of tinnitus, however is effective for improving tinnitus-associated depression and quality of life.

Another intervention, known as tinnitus retraining therapy (TRT), is a habituation therapy that has been in application for 25 years. TRT was developed by Jastreboff (1990) and involves a combination of counselling and sound therapy ("Tinnitus retraining therapy",

2010). The primary aim of TRT is to habituate the brain to tinnitus by removing connections between the auditory system and the limbic and autonomic nervous systems. (Jastreboff, 2015). The counselling component of TRT is used to reclassify tinnitus as a neutral stimulus, while sound therapy is utilised to reduce tinnitus-related neural activity (Jastreboff, 2015). According to Jastreboff and Jastreboff (2000), successful patients are still aware of their tinnitus, but do not find it bothersome. There are currently more than 100 publications on TRT, and findings suggest that the technique provides help for the majority of patients (Jastreboff, 2015). In a systematic review comparing the outcomes of CBT and TRT, Grewal, Spielmann, Jones, & Hussain (2014) conclude that both techniques are effective in treating tinnitus, with neither being superior to the other.

Because many tinnitus sufferers also have hearing loss, hearing aids are often used to manage both ailments, and 88% of clinicians consider hearing aids their primary strategy for managing tinnitus. (Kochkin & Tyler, 2008). An early study by Saltzman and Ersner (1947) provided examples of five case studies where patients experienced tinnitus relief through the use of amplification. Modern research has demonstrated that hearing aids may decrease the audibility of tinnitus (McNeill, Távora-Vieira, Alnafjan, Searchfield, & Welch, 2012) and reduce stress through improved communication ability (Del Bo & Ambrosetti, 2007). According to Folmer and Carroll (2006), tinnitus patients with significant hearing loss receive more benefit from hearing aids than those without significant hearing loss.

In a 25-year prospective study, Trotter and Donaldson (2008) assessed the impact of hearing aids on tinnitus perception. The authors found that the use of hearing aids allowed patients to habituate to their tinnitus, with 67% of unilaterally aided patients and 69% of bilaterally aided patients reporting improved tinnitus perception (Trotter & Donaldson, 2008). In a recent review concerning the use of hearing aids for tinnitus intervention, Shekhawat, Searchfield, and Stinear (2013) deduce that there is sufficient scope of evidence in support of

fitting hearing aids to manage tinnitus, although some studies are not of high quality. One study (Searchfield, Kaur, & Martin, 2010) used results from the tinnitus handicap questionnaire (THQ) to measure the effectiveness of amplification in combination with counselling for treating tinnitus. Findings indicate that hearing aids are effective when used alongside counselling, and that patients experienced twice the reduction in tinnitus handicap when using amplification with counselling compared to those whose treatment was counselling alone (Searchfield et al., 2010).

Indeed, there are numerous treatment options with various levels of empirical support, and investigating each option is beyond the scope of the present paper. Nonetheless, careful attention must be given to the first step in tinnitus treatment: patient knowledge. It is important that tinnitus patients are aware that various treatment options exist and the outlook is not hopeless. Such information can be communicated through written patient education materials. Tinnitus information brochures are widely distributed to patients who enquire about tinnitus, but how useful are they? Certainly, a patient must be able to read and understand a brochure before it may be of any use.

### **1.3 Patient Education**

Patient education is defined as “a planned learning experience that uses a combination of methods such as teaching, counselling and behaviour modification techniques to influence a patient's knowledge and health behaviour” (Schrieber & Colley, 2004, pp. 465–466). According to Redman (2007), patient education is a vital part of every health practice (as cited in Henry et al., 2007). The importance of patient education must not be underestimated, no matter how simple a task may seem: a brilliant treatment plan will be unsuccessful if the patient has not been taught the importance of taking the prescribed medication regularly (Dent, 2000). Evidence suggests that patient education is effective across a variety of health

disciplines, from treating asthma, to managing chronic kidney disease, to skin and wound care (Gallefoss, 2004; Hess, 2008; Kalantar-Zadeh, 2013).

Several researchers over the past decades have promoted patient education for tinnitus patients (Wilson et al., 1998). According to Lockwood and colleagues (2002), education and reassurance are effective tools in managing tinnitus, and stem from open communication between clinician and patient. In their clinical practice guideline, Tunkel et al. (2014) outline evidence-based recommendations for clinicians with tinnitus patients. Tunkel and colleagues recommend that clinicians educate patients about management strategies and inform them by providing brochures, suggesting self-help books, and describing counselling and sound therapy options. One goal of providing an informational brochure is to improve a patient's knowledge about his or her condition. A better understanding of tinnitus can help reduce stress and anxiety about the condition, which in turn may help reduce tinnitus (Mazurek, Szczepek, & Hébert, 2015). Stress is sometimes considered a trigger of tinnitus, and patients have reported that their tinnitus is louder when they are under increased stress (Mazurek et al., 2015).

In a meta-analysis reviewing psychological and educational tinnitus interventions, Andersson and Lyttkens (1999) conclude that such interventions are effective for reducing tinnitus annoyance, with a Cohen's effect size value of  $d = 0.86$ . According to Cohen (1977), an effect size of 0.8 or greater is considered a large effect in clinical research. Tinnitus retraining therapy, described in section 1.2.5, aims to habituate negative reactions associated with tinnitus through structured educational counselling (Henry et al., 2007). In their study evaluating the effectiveness of educational counselling for veterans with significant tinnitus, Henry and colleagues found that group educational counselling is beneficial for tinnitus management. Their findings indicate that education empowers patients as they learn how to

self-manage their tinnitus, and that a group setting allows for sharing of ideas among tinnitus sufferers.

Although research indicates that educational counselling is effective, it is not widely used in practice because it can be costly and time-consuming for clinicians (Henry et al., 2005; Henry et al., 2007). While group counselling sessions may alleviate those drawbacks, there may not be enough demand to support a group session outside of a specialist tinnitus clinic. An alternative to educational counselling is providing patient education materials, such as brochures, which has become a common way for clinicians to communicate health information to patients (Dent, 2000). Clinicians may use printed materials as a primary teaching tool or to reinforce information that was communicated verbally (Shieh & Hosei, 2008). Furthermore, printed materials allow patients more time to read and comprehend information (Redman, 2007, as cited in Shieh & Hosei, 2008).

## **1.4 Health Literacy**

As stated above, providing patient education materials can be beneficial for both patients and clinicians. A major factor in determining a patient's ability to comprehend printed materials is the concept of health literacy. The term "health literacy" was coined by Simonds in 1974, and emerged from the field of public health (Johnson, 2014). Following this introduction, there were few references to health literacy in the literature until 1992 (Johnson, 2014). Because health literacy is a relatively new construct, there is no unanimously agreed upon definition (Sørensen et al., 2012). Early approaches to health literacy focused on individual functional skills (Prins & Mooney, 2014), as exemplified by this definition from Ratzan and Parker (2000): "[health literacy is] the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions" (as cited in Institute of Medicine, 2004, p.20). This approach focused predominantly on skills like reading comprehension, with a

frequently cited example being a patient who incorrectly uses medication after misinterpreting the instructions on the bottle (Institute of Medicine, 2004; Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Health literacy attracted a great deal of attention in the United States in the early 2000s, when research demonstrated that low health literacy was associated with high costs to the health care system (Nutbeam, 2008; Sørensen et al., 2012). Research findings indicated that low health literacy is associated with poorer health knowledge and comprehension, increased hospitalizations and emergency care, and decreased use of preventative health care (DeWalt, Berkman, Sheridan, Lohr, & Pignone, 2004; Institute of Medicine, 2004; Ministry of Health, 2010).

More recently, research into health literacy has become a global endeavour, and the concept has evolved in complexity (Sørensen et al., 2012). The paradigm has shifted from a focus on an individual's skills to the demands imposed by the health care system on the individual (Shoemaker, Wolf, & Brach, 2014). This approach highlights the interaction between the demands of social systems and individual skills (Sørensen et al., 2012), such as considering conditions that limit access to healthcare, rather than placing the burden on individuals to solve the problem by improving their own skills (Prins & Mooney, 2014). Findings from over 300 studies indicate that health information cannot be understood by the majority of the intended recipients, suggesting that health care professionals make inaccurate assumptions about the general population's level of health literacy (Institute of Medicine, 2004). Health professionals do not always check whether patients have received the correct information or that they have understood it (Reid, 2014).

People with low health literacy are more likely to make poor decisions when it comes to seeking care and managing health conditions. Such poor decisions can have a negative effect on an individual's quality of life (Zamora & Clingerman, 2011). There is strong evidence showing that low health literacy is associated with poor health status (Ministry of

Health, 2010; Nutbeam, 2008). For example, a systematic review found that low health literacy is associated with decreased mammography screening and influenza immunizations, and among elderly people, low health literacy is associated with a higher mortality rate (Berkman et al., 2011).

The impacts of low health literacy are far reaching, as nearly half of all American adults have limited health literacy skills (Berkman et al., 2011). Furthermore, the prevalence of low health literacy is higher among the ageing population (Zamora & Clinger, 2011). This is particularly concerning because those in older age groups are typically high users of health services (Ministry of Health, 2010). In New Zealand, an estimated 56% of adults have low health literacy skills, with Māori demonstrating lower health literacy skills than non-Māori (Ministry of Health, 2010). Among Māori, it is particularly younger and older adults who have lower health literacy skills than non-Māori (Clendon, 2012). Yet, on average, both Māori and non-Māori across all age groups have low health literacy skills (Ministry of Health, 2010).

To obtain New Zealand data, the Adult Literacy and Life Skills Survey (ALL) was administered to a nationally representative sample of 7000 adults (Ministry of Health, 2010). The ALL survey contains 191 health-related questions across four domains: prose literacy, document literacy, numeracy, and problem solving. One key finding from the ALL survey was that New Zealanders with a tertiary education are more likely to have higher health literacy than those with lower levels of education (Ministry of Health, 2010). This finding is consistent with international evidence, and some researchers believe that education is a useful predictor for health literacy (Lee, Choi, & Lee, 2015; Rudd, Kirsch, & Yamamoto, 2004).

Similarly, other research suggests that low general literacy (reading ability) is associated with poor health outcomes (Parker, 2000). In a systemic review exploring this relationship, DeWalt and colleagues (2004) found that reading ability is related to knowledge



about health and health care. More specifically, people who read at lower levels are more likely to have a negative health outcome than those with a higher reading level. Despite this, the concepts of general literacy and health literacy should not be confused. There is an important distinction between the two terms, and reading skill level is not always indicative of an individual's ability to understand health information (Mayer & Villaire, 2009).

Removing barriers to positive health outcomes requires a collaborative approach. At the ground level, it is crucial that health professionals are aware of the prevalence of low health literacy among their patients and adapt their behaviour accordingly. For example, it is recommended that practitioners speak slowly and avoid jargon during consultations (Benyon, 2014; Rudd, 2010). It is also imperative that professionals exhibit an approachable and encouraging demeanour (Benyon, 2014), as most patients will be too embarrassed to admit when they have not understood what was said (Ad Hoc Committee on Health Literacy, 1999; Parker, 2000). At a higher level, improved school curricula and increased accountability for health literacy policies are required (Institute of Medicine, 2004). Another step in achieving higher health literacy is to ensure that patient education materials are of high quality and are easy to read. According to Rudd (2010), well-designed materials can improve patient self-management. Related to this topic are the concepts of readability and suitability, addressed in the following sections.

## **1.5 Readability**

The term “readability” addresses how easily a printed material is read (Laplante-Lévesque, Brännström, Andersson, & Lunner, 2012). Readability is a central concept because materials that are difficult to read may affect a reader's comprehension (Badarudeen & Sabharwal, 2010). Inadequate readability can be detrimental to those with poor reading skills, and data show that functional literacy ranges from 7% to 47% in developed countries (Nutbeam, 2008). People with low literacy skills take words literally, skip over unfamiliar

words, and miss meaning and context (Doak, Doak, & Root, 1996). It is crucial that patient education materials are easy to read to help prevent such consequences.

Readability is often expressed in terms of reading grade level (RGL), which is used to define the difficulty of the text (Badarudeen & Sabharwal, 2008). The term “grade level” comes from the United States educational system, where a student’s grade indicates what year of school the student is in. When a RGL estimate is made, it means that an average reader in that grade should be able to understand the text (Ley & Florio, 1996). It is recommended that written patient education materials be written no higher than the sixth grade level (Cotugna et al., 2005; Mayer & Villaire, 2009; National Library of Medicine, 2013). Despite this guideline, health materials are typically written at or above the 10<sup>th</sup> RGL (Cotugna et al., 2005; Hill-Briggs & Smith, 2008; Shieh & Hosei, 2008; Vallance et al., 2008). A lower RGL benefits everyone, not just those with poor reading skills, and research suggests that people of all literacy levels prefer materials written at a lower RGL (Davis et al., 1998). Benefits of a lower RGL include improved comprehension and shorter reading time (Davis et al., 1996).

Evaluating readability offers an objective way to evaluate one aspect of the appropriateness of a printed material for its intended audience. A conventional method for estimating a material’s readability is to use a readability formula.

### **1.5.1 Readability formulas**

Readability of a text is typically estimated using one or more multiple regression equations, known as readability formulas (Ley & Florio, 1996). A readability formula generally measures two aspects of a text, such as word length and sentence length, to produce a score. The score signifies the relative difficulty of the text or the RGL required to understand the text (Lenzner, 2013).

Readability formulas are typically validated against a set of passages that have been assigned to a RGL based on student performance on a comprehension test (Ley & Florio,

1996). Passages are assigned to the mean grade at which students can answer a certain percentage of questions correctly (Ley & Florio, 1996). The percentage of questions that must be answered correctly varies across readability formulas. For example, one formula may assign RGL based on a score of 75% correct, while another formula is based on 100% of questions being answered correctly. A less frequently used method of validation is the cloze procedure (Taylor, 1953), where readers must complete blank spaces within a passage with the words they think should be used (Wang, Miller, Schmitt, & Wen, 2013). The cloze procedure is based on the premise that individuals with higher reading skills are better able to fill in the missing words than those with lower reading skills (DuBay, 2004).

There are numerous readability formulas for researchers to choose from. It is estimated that over 200 formulas had been published by the 1980s (DuBay, 2004), and new formulas are constantly being developed (Benjamin, 2012). This thesis will utilise five formulas, including Simple Measure of Gobbledygook (SMOG), Flesch Reading Ease Score (FRE), Flesch-Kincaid Grade Level Formula (F-K), Fry Readability Graph (Fry), and Gunning's Fog Index Readability Formula (FOG). Each formula is described below.

The SMOG formula (McLaughlin, 1969) estimates how many years of education are required for 100% comprehension of the text. The estimation is based on the number of polysyllabic words in three samples of 10 sentences each. SMOG is valid from the 3<sup>rd</sup> through 19<sup>th</sup> RGLs, although may be less accurate below the sixth RGL (D'Alessandro, Kingsley, & Johnson-West, 2001). SMOG is often the preferred formula for use with health materials, as ensuring 100% comprehension is particularly important in the health care context where even small errors in comprehension can have major implications for patient well-being (D'Alessandro et al., 2001; Wang et al., 2013). For example, misunderstanding of a recommended treatment can result in suboptimal patient care (Wang et al., 2013).

The FRE formula (Flesch, 1948) measures readability using sentence length and word length, and is based on 75% comprehension of the text. Unlike most other readability formulas, FRE produces a readability score rather than a RGL. The readability score equates to a level of difficulty ranging from 0 (unreadable) to 100 (very easy to read). The score is calculated by dividing the number of syllables per word by the total number of words in the sample, and multiplying by 100.

The F-K formula (Kincaid, Fishburne, Rogers, & Chissom, 1975) is an adapted version of FRE and is valid between the 3<sup>rd</sup> and 12<sup>th</sup> RGLs. It was first developed for the United States military and is widely used today (Kong & Hu, 2015). F-K differs from most other formulas as the validating criterion was the cloze procedure rather than a comprehension test (Wang et al., 2013). F-K is widely used due to convenience because it is often included in word processors such as Microsoft Word (Friedman & Hoffman-Goetz, 2006; Paasche-Orlow, Taylor, & Brancati, 2003). Furthermore, F-K is highly correlated with other readability scales (Paasche-Orlow et al., 2003). Like FRE, the F-K formula estimates readability based on 75% comprehension of the text (Ley & Florio, 1996), and has been criticized for underestimating the readability of a passage (D'Alessandro et al., 2001).

The Fry formula (Fry, 1968) determines RGL by calculating the average number of sentences and syllables in a passage. Results are plotted on a graph to determine the approximate grade level of the material. While most formulas are validated by comprehension tests or the cloze procedure, Fry estimates of RGL are based on publisher-recommended ratings of books, which can make the estimates difficult to interpret (Wang et al., 2013). Nevertheless, Doak and colleagues (1996) recommend the Fry above other formulas because it is widely accepted in the reading literature and does not require an excessive sample.

The final formula used in this thesis is FOG (Gunning, 1973), which produces a score determined by sentence length and number of polysyllabic words. FOG estimates RGL

required for 90% comprehension of a text, which lies between the comprehension levels used in SMOG (100%) and FRE/F-K (75%). Because FOG counts polysyllabic words only, it requires less time to administer than FRE and F-K when done manually (Friedman & Hoffman-Goetz, 2006). This factor is less relevant now that the formula is available in a computerized version. One drawback of FOG is that not all polysyllabic words are counted, such as hyphenated words or words that would have been two syllables if not for an *-es* or *-ed* suffix (Ley & Florio, 1996). The formula does, however, correlate well with Fry and SMOG (Friedman & Hoffman-Goetz, 2006).

While readability formulas are a quick and useful tool for researchers, they are not without limitations. Readability scores are merely predictors of a reader's comprehension, as motivation and prior knowledge of the material are not accounted for (Friedman & Hoffman-Goetz, 2006; Kong & Hu, 2015). Other important factors that contribute to comprehension, such as the material's layout, syntax, font size, and use of images are also unaccounted for (Doak et al., 1996; Kong & Hu, 2015). Although readability formulas should not be relied upon solely when assessing printed materials, they make a valuable contribution to a researcher's overall evaluation.

### **1.5.2 Readability in audiology**

There is an emerging body of research aimed at evaluating the readability of patient education materials within the scope of audiology. In a current New Zealand study, Donald (2015) evaluated a paediatric audiology report using readability analysis and parent interviews. Her findings suggest that current reports are written in such a way that is difficult for most parents to read and comprehend. Donald revised the report using best practice guidelines and parental recommendations, and the revised version showed marked improvement in terms of readability and comprehension. A similar study by Joubert and Githinji (2014) evaluated the quality and readability of 21 informational pamphlets on

paediatric hearing loss in South Africa. Joubert and Githinji reported that the majority of pamphlets presented with “serious problems” relating to quality and content, while the average readability level was higher than the recommended reading level.

Questionnaires used in audiology have also been subject to evaluation. Atcherson, Richburn, Zraick, and George (2013) used three readability formulas, including FRE and FOG, to evaluate readability of questionnaires used to assess listening difficulties associated with auditory processing disorders. The researchers found that the readability of all eight questionnaires was written above the recommended RGL, and recommend that clinicians consider parents’ health literacy skills when questionnaires are completed by proxy. Similarly, a study examining the readability of four self-report measures used in rehabilitative audiology reported that every questionnaire was deemed to have inadequate readability by each of the three readability formulas used (Kelly-Campbell, Atcherson, Zimmerman, & Zraick, 2012).

### **1.5.3 Readability of tinnitus information**

There are complementary findings from research on tinnitus-related materials, however the number of studies is relatively limited. Fackrell, Hoare, Smith, McCormack, and Hall (2012) evaluated the readability and quality of tinnitus information websites in the UK. Of the 10 websites evaluated, six had inadequate readability and some potentially serious shortcomings concerning quality. Atcherson and colleagues (2011) performed readability analysis on 15 tinnitus-focused questionnaires and found that the majority of questionnaires were written above the recommended fifth to sixth RGL. In a recent MAud thesis, Logan (2015) assessed the readability of two tinnitus brochures using the same five readability formulas used in this thesis (SMOG, FRE, F-K, Fry, and FOG). The mean RGL of both brochures was around 10<sup>th</sup> to 11<sup>th</sup> grade, far exceeding the recommended RGL of fifth to

sixth grade. These findings indicate that many printed tinnitus materials have inadequate readability for the general public.

## 1.6 Suitability

As mentioned in section 1.5.1, there are other factors to consider when evaluating printed materials in addition to readability. The term “suitability” refers to how appropriate a material is for the intended audience. Doak and Doak (2010) recommend two methods for assessing suitability: review the printed material against specified suitability criteria, or field-test the material with a sample of the target audience. Clearly, the first option is more convenient and time efficient. A suitability tool was developed by Doak and colleagues (1996), known as the Suitability Assessment of Materials (SAM). The SAM encompasses 22 criteria-based factors within six categories: 1) content, 2) literacy demand, 3) graphics, 4) layout and typography, 5) learning stimulation and motivation, and 6) cultural appropriateness (Doak & Doak, 2010). Each factor is scored on a scale of 0 to 2, with a maximum possible score of 44. The score is then converted to a percentage, which corresponds to a suitability rating of *superior* (70–100%), *adequate* (40–69%), or *not suitable* (0–39%). Elements of the SAM and *superior* evaluation criteria are depicted in Table 1 below.

**Table 1.** SAM categories and ‘superior’ evaluation criteria.

Category	Factors required for <i>superior</i> rating
Content	Purpose is explicitly stated in title, cover illustration, or introduction. Most content is application of knowledge/skills aimed at the reader. Scope is limited to essential information directly related to the purpose. A summary is included and retells the key message.
Literacy demand	RGL is fifth grade or lower. Conversational writing style, use of simple sentences, and active voice. Use of common words. Technical words and concepts are explained with examples. Use of imagery words.

	Context is given before presenting new information.
	Use of headers or topic captions.
Graphics	<p>Cover graphic is friendly, attracts attention, and portrays purpose.</p> <p>Illustrations are simple, appropriate for adults, and familiar to readers.</p> <p>Illustrations present key messages without being a distraction.</p> <p>Lists, tables, etc. are explained by directions.</p> <p>Use of captions for graphics.</p>
Layout & typography	<p>Compliance with at least 5 of the following:</p> <ul style="list-style-type: none"> <li>▪ Illustrations are adjacent to related text.</li> <li>▪ Layout and sequence of information is consistent.</li> <li>▪ Use of visual cuing devices (shading, boxes, arrows).</li> <li>▪ Adequate white space present.</li> <li>▪ Use of colour supports message and is not distracting.</li> <li>▪ Line length is 30–50 characters and spaces.</li> <li>▪ High contrast between type and paper.</li> <li>▪ Paper has non-gloss or low-gloss surface.</li> </ul> <p>Text type is in upper- and lower-case serif and is at least 12-point font size. Typographic cues (bold, size, colour) emphasise key points.</p> <p>Use of subheadings to group lists.</p>
Learning stimulation, motivation	<p>Use of questions/problems for reader responses.</p> <p>Instruction models specific behaviours.</p> <p>Subdivision of complex topics into small parts.</p>
Cultural appropriateness	<p>Central concepts are culturally similar to the logic, language, and experience of target audience.</p> <p>Images and examples present the culture in positive ways.</p>

The SAM has been validated (Doak, Doak, Miller, & Wilder, 1994) and is frequently used in studies examining printed health information (Caposecco, Hickson, & Meyer, 2011; Rhee, Von Feldt, Schumacher, & Merkel, 2013). In a systematic review, Finnie, Felder, Linder, and Mullen (2010) examined the suitability of printed and web-based cancer



education materials. In their literature search, Finnie and colleagues found seven suitability tools evaluating 432 patient education materials. Of the seven tools, only the SAM and one other tool (Comprehensibility Assessment of Materials) had evidence of validity. Findings from the review indicate that the materials had several shortcomings in terms of suitability, with one example being that cultural appropriateness of most materials was only *adequate* or *not suitable* due to the images used (Finnie et al., 2010).

### **1.6.1 Suitability in audiology**

Within the scope of audiology, published suitability studies are limited. In one recent study, Caposecco and colleagues (2014) used the SAM to evaluate 36 hearing aid user guides in terms of content, design, and readability to determine their suitability for older adults. Caposecco et al. reported that 69% of the user guides were *not suitable*, while 31% were rated as *adequate*, indicating that all of the user guides in the study could be improved. Suggestions for improvement include lowering the RGL, replacing technical terms with familiar words, inserting captions for graphics, and increasing font size (Caposecco et al., 2014).

In a recent MAud thesis, Potter (2015) investigated the suitability of online hearing-related healthcare materials available to New Zealand consumers. Using the key terms “hearing loss” and “hearing aids” with search engine Google New Zealand, Potter retrieved 510 webpages from 19 different websites. The websites were categorised by origin, comprising eight non-profit, six commercial, and five government websites. Two research audiologists evaluated the suitability of the websites using the SAM. Results showed that commercial websites had significantly higher SAM scores than non-profit websites, yet all of the assessed websites were rated as *not suitable*. On average, SAM factors with the highest ratings were typography, type of graphics, layout, and evident purpose. The factor with the lowest rating was RGL, for which all websites received a score of 0 out of 2. Other low-scoring factors were use of interaction and cultural appropriateness. These findings suggest

that most online hearing-related healthcare materials are not suitable for the general population.

### **1.6.2 Suitability of tinnitus information**

Even more limited is suitability research specific to tinnitus. No published articles were located during the author's literature search, however there are some insightful results from a recent MAud thesis. Logan (2015) evaluated the suitability of two tinnitus brochures provided at a private hearing aid clinic in Christchurch, New Zealand. The first brochure (Brochure 1) is provided to all tinnitus patients; the second brochure (Brochure 2) is a more detailed brochure and is provided to some tinnitus patients. Two research audiologists evaluated the brochures using the SAM. Brochure 1 was rated as *not suitable* with an overall score of 38.1%, while Brochure 2 was rated as *adequate* with an overall score of 47.6%.

Brochure 1 was rated highest in the content and literacy demand categories, with a score of 62.5% (*adequate*) in each of the two categories. Brochure 1 received the lowest scores in terms of graphics (30%), layout and typography (33.3%), and learning stimulation (0%), deeming the brochure as *not suitable* in these categories. Brochure 2 was rated as adequate for literacy demand (62.5%) and layout and typography (66.7%), but was rated *not suitable* in terms of learning stimulation (33.3%). Furthermore, Brochure 2 barely achieved an *adequate* rating for graphics with score of 40%. These findings suggest that both brochures can be improved, particularly in terms of learning stimulation and graphics.

## **1.7 Best Practice**

Based on findings from readability and suitability research described above, the majority of patient education materials could be improved. The disparity between printed information and patient comprehension occurs because health care professionals who create the materials do not share the same logic, language, and experience as the general population

(Doak et al., 1996). For this same reason, it is imperative that best practice guidelines are followed when engaging in the task of improving materials to ensure that revision is effective. The following sections will describe recommendations for revision and provide evidence of successful document revision.

### **1.7.1 Revising patient education materials**

An excellent guide for improving patient education materials is provided in a book titled *Teaching Patients with Low Literacy Skills* by Doak, Doak, and Root (1996). The 10<sup>th</sup> chapter, “land Revision of Materials”, provides step-by-step instructions for completing the process and evaluating its results. The concept of learner verification and revision is defined as “an interview procedure to verify the suitability of a health instruction with the population who use it” (p. 167). The procedure is convenient for authors to use as it is not time-consuming and only small samples are needed for the interview.

Following the learner verification and revision of materials procedure allows authors to identify how likely it is that the printed material will influence the target audience by verifying five elements: 1) attraction, 2) comprehension, 3) self-efficacy, 4) cultural acceptability, and 5) persuasion. The first element, attraction, refers to the material’s ability to entice the audience into reading it. Interesting visuals can be used to create appeal, and it is important that any colours used fit the tone and mood of the message. The next element, comprehension, is especially important for patients with low literacy skills. A material allows for adequate comprehension if patients can relay the message in their own words. Next, self-efficacy denotes that after reading the material, patients believe they have enough information to act on the message. The fourth element, cultural acceptability, should be verified to confirm that the material does not cause readers offense or annoyance. Cultural suitability may be affected by images that contain certain background settings, styles of dress, and even hairstyles. Verifying the final element, persuasion, ensures that the material’s message is able

to convince people that they should take action. These five elements align with Hoffman and Worrall's (2004) assertion that materials must be noticed, read, understood, believed, and remembered in order to have influence.

Doak et al. (1996) describe three phases for carrying out the process. First is the preparation phase, which includes identifying the purpose of the material, preparing for the interview, and deciding who to include in the sample. Alluding to Federal Plain Language Guidelines, it is vital that authors know who their audience is, without making guesses or assumptions (PLAIN, 2011). Many researchers identify precise objectives for patient education materials and nominate specific cultural groups as the intended audience. Jones and colleague (2011) developed and field-tested a health pamphlet tailored for an at-risk Indo-Asian population in Canada. They translated an existing English language pamphlet into four Indo-Asian languages and field-tested the material at a screening programme. In another example, Vadaparampil and Pal (2010) revised and evaluated a community study brochure aimed at young African American breast cancer patients. These articles demonstrate the importance of setting clear objectives and knowing who the audience is.

The second phase involves interviewing a sample of 10 people from the target audience. Doak and colleagues (1996) recommend that interview respondents are encouraged to refer to the material during the interview session and that responses are recorded verbatim. In a study by Quinn and colleagues (2005), pregnant and postpartum women participated in semi-structured interviews to gather insight for the revision of smoking relapse prevention materials. The researchers developed their interview questions based on empirical evidence, probed participants on key issues, and transcribed responses verbatim (Quinn et al., 2005). These techniques allowed the researchers to identify key themes from their target population, which differed from themes identified by similar populations. Quinn and colleagues acknowledge that researchers assuming the role of interviewers can lead to researcher bias,

but advise that this predicament can be kept to a minimum through the use of multiple reviewers and inter-rater reliability checks.

The final phase of the process is to evaluate interview responses and revise the material. It is recommended that special attention be given to interview answers that differ from what was expected; the differences should be evaluated by asking oneself if the misunderstanding could cause real problems. Additionally, it is useful to note whether problems occur throughout the material or are localized, as some passages will have more significance than others (Doak et al., 1996). When determining which changes should be implemented during revision, the decision should be based on three criteria: 1) the importance of incorrect responses based on the material's purpose, 2) how many respondents answered incorrectly, and 3) cultural acceptance and self-efficacy responses (Doak et al., 1996, p. 183).

When re-writing material, it is advantageous to limit word and sentence length in order to achieve appropriate readability. Regarding language, authors should be precise with their words and write in the present tense to make reading easier for the audience (PLAIN, 2011). Furthermore, authors should write in the active voice to eliminate ambiguity about responsibilities, e.g. "you must do it" is more effective than "it must be done" (PLAIN, 2011, p. 20). However, authors must be mindful when using imperatives like "must" or "should", as such language may come across as patronising or judgemental (Hoffman & Worrall, 2004). An alternative is to use a phrase that begins with, "You may find it useful to..." (Hoffman & Worrall, 2004).

Further consideration must be given to design characteristics, including layout, legibility, and illustrations (Griffin, McKenna, & Tooth, 2003). Text should be laid out with adequate spacing to reduce eye fatigue, and summary sections are recommended (Griffin et al., 2003). To enhance legibility, a minimum 12-point font size should be used, headings should be featured in bold print, and using all upper case lettering should be avoided (Doak et

al., 1996; Griffin et al., 2003). Finally, illustrations can provide useful examples for readers and help break up text (PLAIN, 2011), but they must be simple and recognisable or otherwise can be distracting and cause confusion (Griffin et al., 2003). After revision is complete, it would be prudent to re-visit the interview phase to confirm that the revised material has improved suitability. Doak et al. (1996) instruct that several drafts may need to be tested before obtaining a satisfactory result. Although retesting is not necessary for minor wording changes, it should be done following a major design alteration.

### **1.7.2 Outcomes of document revision**

Although ample research has been conducted showing the need for document revision, there is limited research that has investigated the outcomes of document revision (Hoffmann & Worrall, 2004). While the breadth of research is limited, there are various studies from across many areas of health education that deem document revision to be a worthwhile endeavour. The studies mentioned in the previous section showed positive outcomes and helped researchers identify areas needing further improvement. In the Jones et al. study (2011), where a health pamphlet was translated into several languages, revision of the pamphlet led to improved readability, as RGL was reduced from the ninth- to the sixth grade level. Changes to the pamphlet included larger font size, reduced word count, removal of jargon, and addition of diagrams. Results from the study showed that all participants found the revised material acceptable and felt it had improved their understanding of the topic.

The goal of the Vadaparampil and Pal (2010) study was to revise and evaluate a brochure for African American women with breast cancer. Through the revision process, the researchers learned which terms the women identified with and what type of images were preferred, and these findings were incorporated into the revised brochure. Results from the learner verification process indicated that the revised material achieved three of the five verification elements (comprehension, self-efficacy, and persuasion) while the remaining two

(attraction and cultural acceptability) needed further improvement. Findings from this study emphasise the importance of involving the target audience and utilising their feedback when revising materials.

Caposecco, Hickson, and Meyer (2011) provide an example of document revision in the field of audiology. In their study, the authors developed written instructions for using a self-fitting hearing aid. Although the researchers did not revise an existing document, they followed a process similar to the learner verification and revision of materials procedure. To determine the best method for developing the instructions, Caposecco et al. were guided by a literature review, which revealed a four-step process: planning, design, suitability assessment, and pilot testing. The instructions were developed following aforementioned recommendations for language, such as using the active voice, implementing short sentences and words, and avoiding jargon and technical language. The authors achieved a user-friendly layout by choosing a large font size, incorporating bold headings, and limiting the amount of text on each page. Suitability assessment yielded a SAM rating in the *superior* category and revealed areas needing improvement. During verification, no one in the pilot group found problems with the quality or content of the material. Based on their findings, Caposecco and colleagues recommend that health professionals follow best practice guidelines when developing printed materials.

In a final example, Logan (2015) revised a tinnitus brochure with the aim of reducing readability to an appropriate level while maintaining the original content of the brochure. Logan concentrated on converting jargon to common words and reducing the amount of polysyllabic words. Further, she replaced the word “tinnitus” with the word “sounds” and minimised sentence length. The revised brochure achieved a sixth grade or lower RGL as deemed by three out of four readability formulas. To verify that the original content was

preserved, a clinician who specializes in tinnitus evaluated the revised brochure. The clinician concluded that the revised brochure maintained the same content as the original version.

## **1.8 Study Rationale**

The above research indicates that tinnitus is a relatively widespread condition for which many people will seek information. Providing printed materials to patients enquiring about tinnitus and other health conditions is a common practice among health professionals. In order for printed materials to be effective, they must be noticed, read, understood, believed, and remembered (Hoffman & Worrall, 2004). Abundant evidence indicates that most printed materials do not have adequate readability or suitability for the general population. Furthermore, even people with adequate literacy skills may not have satisfactory health literacy skills to function effectively in the health system. When patients have low health literacy skills, they may be unable to make an informed decision when presented with patient education material. This can be detrimental for those who seek information about tinnitus, and are given a brochure that they cannot understand. While an appropriate long-term goal might be to increase health literacy skills through education, immediate action calls for improving patient education materials to make them more useful to the general population. Improving people's understanding of health information is critical for patient empowerment (World Health Organization, 2009), and is therefore essential to aid in managing a condition such as tinnitus.

Although there have been numerous studies investigating the readability of patient education materials, a smaller amount of research has been dedicated to assessing the suitability of such materials. There is a limited amount of this type of research in the field of audiology, especially concerning the topic of tinnitus. Some studies have evaluated tinnitus patient information using websites and questionnaires as the materials, but none have evaluated a tinnitus brochure; other studies have evaluated informational pamphlets



concerning hearing aids or hearing loss, but not tinnitus. The purpose of this thesis is to fill the gap in the knowledge base for analysis and revision of a tinnitus brochure.

The present study will analyse a brochure using several readability formulas, the SAM, and participant feedback from a group of tinnitus sufferers. The researchers will carry out the revision process following best practice guidelines outlined by Doak et al. (1996), including the second and third phases of the learner verification procedure. The present study is clinically relevant because tinnitus is a prevalent condition, especially among the elderly, so there is a specific target population that could benefit from the improved brochure. Further, the brochure to be evaluated is currently being distributed by a Christchurch audiologist who specialises in tinnitus diagnosis and care. Since the brochure is frequently given to patients, it is important that the brochure is comprehensible and suitable for those who receive it.

## **1.9 Aims and Hypotheses**

The aims of the project are to evaluate and revise a tinnitus brochure. To address the first aim, a tinnitus brochure will be evaluated in terms of readability and suitability, using SMOG, FRE, F-K, Fry, FOG, and SAM. The brochure will be further evaluated using learner verification, in which a group of participants are interviewed about the printed material. The group will comprise adults who experience tinnitus. To address the second aim, the brochure will undergo a revision process to achieve adequate readability and suitability, taking into account participants' opinions and best practice guidelines for health education. Following the revision, the group of participants will be interviewed a second time about the revised material. The goal is for the revised material to show an improvement, as indicated by readability and suitability measures along with participant feedback.

The following research questions address the aim of evaluating a tinnitus brochure:

- a) What is the RGL of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?

b) What is the suitability of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?

The following hypotheses address the aim of revising a tinnitus brochure:

- a) The revised tinnitus brochure will have a readability level no greater than the sixth RGL.
- b) The revised tinnitus brochure will have a SAM score  $> 39\%$ .
- c) The participants will indicate the revised brochure does not require further revision.

## **CHAPTER TWO: METHOD**

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### **2.1 Overview**

The aims of this thesis were to (1) evaluate and (2) revise a tinnitus brochure. To address the first aim, a tinnitus brochure was evaluated in terms of readability and suitability, using standardised measures. The brochure was further evaluated using learner verification, in which a group of participants were interviewed for their opinions about the brochure. The group comprised people who experience tinnitus. To address the second aim, the brochure underwent a revision process to achieve adequate readability and suitability, taking into account participants' opinions. Following the revision, the group of participants were interviewed a second time about the revised material. The goal of this project was for the revised material to show an improvement, as indicated by readability and suitability measures along with participant feedback. This chapter will describe the methodology behind the research plan.

### **2.2 Tinnitus Brochure**

The tinnitus brochure (Appendix A) was provided by a Christchurch audiologist who specialises in tinnitus diagnosis and care at a private hearing aid clinic. The brochure was chosen for evaluation because it is currently in use and is frequently given to tinnitus patients. Thus, revision of the brochure may have important clinical applications.

#### **2.2.1 Readability analysis of tinnitus brochure**

Readability analysis of the tinnitus brochure was performed using Readability Studio version 2012.1 software (Oleander, 2014). The content of the brochure was transcribed onto a Microsoft Word 2007 document for use in the software programme. To determine the document structure, the composition was selected as “narrative text”, and the layout was

“centred/left-aligned”. “Technical report” was selected as the document type.

The five readability formulas utilised in this thesis were SMOG, FRE, F-K, Fry, and FOG. The FRE formula produced a readability score on a scale from 0 (unreadable) to 100 (very easy to read). The other formulas estimated the RGL required to understand the brochure. Upon completion of the revision process, the revised version of the brochure underwent the same procedure for readability analysis.

### **2.2.2 Suitability analysis of tinnitus brochure**

It was important that researchers not involved in the revision process evaluated the suitability of the original and revised brochures. Therefore, two PhD-level research audiologists rated the brochure using the SAM. The audiologists respectively have 17 and 13 years clinical adult rehabilitation experience. Both researchers have had previous experience using the SAM to evaluate audiology consumer material. Each researcher reviewed the SAM materials provided by Doak et al. (1996). Each researcher independently evaluated two tinnitus brochures that were not part of the study and discussed any discrepancies in scores. Finally, they independently evaluated the study material to derive a SAM score. Upon completion of the revision process, the researchers independently evaluated the revised version of the brochure to derive a SAM score.

## **2.3 Participants**

### **2.3.1 Recruitment**

In order to obtain opinions from the brochure’s target audience, participants who experience tinnitus were recruited for the study. Ten participants were sought in accordance with guidelines from Doak et al. (1996), who recommend approximately 10 participants to complete the learner verification and revision procedure. Participants were recruited over a five-week period using a combination of purposive and convenience sampling. Recruitment

flyers were posted at six locations in the Christchurch area, including libraries, a hearing clinic, and a shopping mall. The flyers included a brief summary of the study aim, eligibility requirements, and inducement offer (Appendix B).

### **2.3.2 Inclusion criteria**

To be included in the study, participants had to meet the following criteria:

- 1) over the age of 18
- 2) experience tinnitus
- 3) able to read and converse in English
- 4) able to travel to the University of Canterbury
- 5) willing to participate in the study

### **2.3.3 Group assignment and withdrawals**

#### ***2.3.3.1 Interview Session 1***

The first 10 people who responded to the recruitment flyers and met inclusion criteria were invited to participate in the study. Of the 10 candidates, all were eligible to participate in the study. The first five candidates who confirmed their participation were scheduled to meet as the first group. Four people attended the first meeting, with one person unable to attend due to illness. The absent participant was re-scheduled to the second group meeting. The second group meeting was scheduled for the following week, with an expected attendance of six people. In total, three people attended the second group meeting. One person did not attend due to continued illness, a second person could not attend due to a scheduling conflict, and a third person withdrew without stating a reason. The groups comprised seven participants in total.

#### ***2.3.3.2 Interview Session 2***

The same seven participants met a second time following brochure revision. Two group meetings were scheduled, with three participants attending each meeting. One

participant could not attend either meeting, so the author arranged a telephone interview with that participant. Participants were not restricted to the same two groups formed during Interview Session 1 (i.e., participants were mixed among groups between the two sessions).

## **2.4 Procedures**

Individuals who expressed interest in the study were contacted via telephone or email to ensure they met inclusion criteria and to provide an overview of the study. If the inclusion criteria were met, individuals were asked for their full names and mailing addresses. Once the details were confirmed, participants were informed they would receive an information packet in the post, consisting of: 1) the information sheet (Appendix C), 2) the consent form (Appendix D), 3) the demographic questionnaire (Appendix E), 4) the Tinnitus Reaction Questionnaire (Appendix F), and 5) the tinnitus brochure. Participants were asked to read the information sheet, read and sign the consent form, fill in the questionnaires, and read the brochure. Participants were instructed to contact the author via telephone after receiving the information packet to schedule the interview. Participants were notified that they would receive a hearing check at the first interview session as part of the study.

Upon contacting the author, participants were asked if they had undergone audiological assessment recently. If a hearing test had been completed in the previous 12 months, the participant was asked to bring the audiogram to the interview session. Those who had not completed a hearing test in the previous 12 months or did not have a copy of their audiometric results were notified they would they would undergo audiological assessment at the interview session. The author scheduled two group interview sessions at the University of Canterbury in order to obtain opinions about the brochure. The first group comprised four participants; the second group comprised three participants. Participants were instructed to bring the consent form, both completed questionnaires, the tinnitus brochure, and a copy of their hearing test results (if applicable) to the interview session.

At Interview Session 1, the first group of participants underwent audiological assessment if required. Both researchers conducted the assessments so that two participants could be tested in the same time period. The interview was conducted in a private location at the University of Canterbury. Completed consent forms and questionnaires were collected at the start of the session. The supervising researcher began the interview by providing participants with an overview of the session, and answered any questions. The session then continued following the interview schedule in Appendix G. The supervising researcher led the question and answer session, while the author recorded written notes. Participants were informed that they would receive a revised version of the brochure in the post after revision was completed. Participants received a \$10 petrol voucher for their time and participation in the study. The same procedure was repeated for the second group of participants.

Following Interview Session 1, the author revised the tinnitus brochure based on participant feedback and best practice guidelines. When the revision process was complete (one week later), the revised brochure (Appendix H) was mailed to participants. The author then contacted participants to arrange Interview Session 2. Two dates were scheduled for Interview Session 2, and participants chose which date to attend. Interview Session 2 took place six weeks after Interview Session 1, and was conducted following the same procedure without audiological assessment. One participant could not attend either meeting date for Interview Session 2, so a telephone interview was arranged for that participant. Each participant received another \$10 petrol voucher for their time and participation in the study. Based on participant feedback from Interview Session 2, the author made a few minor changes to the revised brochure, resulting in a final version.

## **2.5 Measures**

The present study utilised two questionnaires to solicit demographic and tinnitus-specific information. Participants also underwent audiological assessment to add to the

demographic characteristics. Finally, the researchers followed an interview schedule to obtain participants' opinions regarding the original and revised version of the tinnitus brochure. Each measure is explained below.

### **2.5.1 Demographic questionnaire**

The demographic questionnaire featured 10 items to solicit basic information about participants in the present study. Participants reported the following demographic information: age, gender, ethnicity, relationship status, annual income, and level of education. The remaining four items addressed audiological factors including tinnitus severity, history of tinnitus treatment, presence of hearing loss, and use of hearing aids. Participants were asked to specify any tinnitus treatment options they had received.

### **2.5.2 Tinnitus Reaction Questionnaire**

The Tinnitus Reaction Questionnaire (TRQ) is a psychological assessment developed to measure quality of life in tinnitus patients (Wilson, Henry, Bowen, & Haralambous, 1991). The TRQ features 26 items that are rated by individuals on a 5-point scale (not at all, a little of the time, some of the time, a good deal of the time, almost all of the time). The responses are scored from 0 to 4, with the maximum score of 104 indicating the highest amount of distress associated with tinnitus. The TRQ has demonstrated high test-retest reliability ( $r = .88$ ) and very high internal consistency (Cronbach's alpha = .96), indicating that the TRQ is a reliable and stable instrument (Wilson et al., 1991).

A factor analysis performed on the TRQ's principal components revealed a four-factor solution accounting for 66.4% of the total variance, with the factors termed: General Distress, Interference, Severity, and Avoidance (Wilson et al. 1991). General Distress accounted for 50% of the variance and pertains to the items relating to feelings of anger, annoyance, helplessness, and despair. Interference accounted for 7.9% of the variance and involves items relating to restriction of work and leisure activities. Next, Severity accounted for 4.6% of the



variance and encompasses more severe signs of distress such as crying and sleeping difficulties. Finally, Avoidance accounted for 3.9% of the variance and involves the items that relate to avoidance of activities.

### **2.5.3 Audiological assessment**

Bilateral hearing thresholds were obtained using pure tone audiometry. Testing took place in sound-treated booths at the University of Canterbury Speech and Hearing Clinic. Stimuli were presented via air conduction using EARTone 3A insert earphones and a calibrated Grason-Stadler GSI-61 audiometer or Interacoustics Equinox 2.0 PC-based audiometer on a Lenovo laptop. Thresholds were obtained at one octave intervals from .25 to 8 kHz following the Modified Hughson-Westlake procedure in accordance with the University of Canterbury Hearing Clinic Protocols (UoC Speech and Hearing Clinic, 2015). Bone conduction testing was not performed.

Two variables were obtained from the audiological assessment: the pure tone average of the better ear (BEPTA) and the pure tone average of the worse ear (WEPTA). The BEPTA was calculated by averaging the better hearing ear's thresholds at .5, 1, 2 and 4 kHz. WEPTA was calculated by averaging the worse ear's thresholds at the same four frequencies.

### **2.5.4 Interview schedule**

Opinions of the original tinnitus brochures were obtained at Interview Session 1. Participants were split into two groups for logistical ease. The researchers followed an interview schedule adapted from Doak et al. (1996). The interview schedule was not piloted on a group of non-participants, as a similar schedule was used in a recent MAud thesis to gain participants' opinions of a hearing aid user guide (Russell, 2015).

The interview schedule featured 20 questions grouped under four topics: 1) attraction, 2) comprehension, 3) self-efficacy, and 4) cultural appropriateness. Questions grouped under the attraction topic were aimed at determining how well the brochure attracted the

participants' attention. Comprehension questions were used to find out how well the brochure helped participants understand the content. Self-efficacy questions were targeted at finding out if the brochure helped participants feel they could manage their tinnitus. Finally, questions regarding cultural appropriateness were used to determine if participants found any parts of the brochure offensive, annoying, or untrue. The interview was semi-structured, so not every question on the schedule was asked at every meeting; however, all four topics were covered appropriately. The majority of questions were open-ended in style, and participants were encouraged to give examples. At the interview's conclusion, the researcher asked if there was anything else participants would like to say about the brochure.

After the revision process was complete, participants attended Interview Session 2 to give opinions and feedback regarding the revised version of the brochure. Researchers followed the same interview schedule utilised in the first session.

## **2.6 Data Analyses**

Descriptive statistics were used to describe the participant sample, and readability and suitability results of the original and revised brochures. Readability results for the original brochure were compared to the recommended fifth to sixth grade reading level. In addition, a comparison was made between readability results of the original and revised brochures.

Inter-rater reliability for the SAM was assessed using the kappa generated from the intraclass correlation coefficient (ICC). Kappa represents the amount of agreement between raters after being corrected for chance (Fleiss & Cohen, 1973). The kappa value is scaled from -1 to +1, with a negative value indicating agreement poorer than chance and a positive value indicating agreement better than chance, with zero signifying agreement that was exactly due to chance (Fleiss & Cohen, 1973). According to Fleiss (1981), kappa values greater than .75 represent excellent agreement beyond chance, while values between .40 and .75 represent fair to good agreement beyond chance. The kappa for the SAM scores of the

original brochure was .944, with a 95% confidence interval between .864 and .977. Therefore, the inter-rater reliability was considered to be adequate. For the revised brochure, the kappa for the SAM was .961, with a 96% confidence interval between .802 and .986, indicating “very good” agreement (Altman, 1991).

Qualitative analysis was used to identify themes from Interview Session 1. The author analysed the written notes recorded during the interview session to identify recurring themes. The same procedure was followed to identify themes from Interview Session 2. The themes from Interview Sessions 1 and 2 were compared to determine if the revised brochure showed improvement, as indicated by participants’ feedback.

## **2.7 Ethical Considerations**

The present study received ethical approval from the University of Canterbury Human Ethics Committee on 13 May 2015 (Appendix I). All procedures conducted in the present study were in accordance with the committee’s approval. All participants signed informed consent forms prior to their involvement in the present study. The present study received approval from the Māori Research Advisory Group on 7 May 2015 (Appendix J), acknowledging that appropriate consideration was given to the cultural aspects of this research, including the potential impact and relevance of this research for Māori communities.

## CHAPTER THREE: EVALUATION

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### 3.1 Overview

The purpose of this chapter is to provide results of tinnitus brochure evaluation. The brochure was evaluated in terms of readability and suitability, following the procedures described in Chapter Two. Once the brochure was deemed to have poor readability and suitability, tinnitus sufferers provided feedback about the brochure at group meetings, known as Interview Session 1. The purpose of the interviews was to obtain specific suggestions for improving the brochure. Results described in the following sections demonstrate the need for the brochure to undergo revision.

### 3.2 Readability and Suitability Assessment

The sections below address the following research questions:

- a) What is the RGL of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?
- b) What is the suitability of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?

#### 3.2.1 Readability of tinnitus brochure

Readability assessment revealed that the tinnitus brochure was written above the recommend fifth to sixth RGL. Assessment was carried out using the five formulas described in Chapter One. SMOG analysis yielded an estimated RGL of 12. The FRE formula produced a reading ease of 57, suggesting that the brochure is fairly difficult to read. The F-K formula indicated that the brochure was written at the 9<sup>th</sup> RGL, while the Fry readability graph produced a RGL of 11. Finally, the FOG formula revealed an estimated RGL of 9.8. The

mean RGL of the tinnitus brochure was 10.5, which is approximately five levels above the recommended RGL.

### 3.2.2 Suitability of tinnitus brochure

Two experienced PhD-level audiologists independently rated the tinnitus brochure using SAM. Twenty-one factors were rated across 6 categories, with a total possible score of 42. The tinnitus brochure received a score of 16, or 38%. Scores ranging from 0–39% are considered *not suitable* for patient education. A breakdown of scores for each SAM category is presented in Table X in Chapter Five.

## 3.3 Participant Characteristics

Seven tinnitus sufferers participated in two group meetings during Interview Session 1. Participants 1–4 comprised the first group; Participants 5–7 comprised the second group.

Table 2 below illustrates participant demographics and Table 3 provides audiometric data.

**Table 2.** *Participant demographic information.*

Participant ID	Gender	Age	Ethnicity	Education	Annual Household Income	Relationship Status
P1	Male	54	NZ European	Tertiary	\$0–\$25,000	Married
P2	Male	64	NZ European	Secondary	\$25,000–\$50,000	Single
P3	Female	72	NZ European	Tertiary	\$50,000–\$75,000	Widowed
P4	Male	66	NZ European	Postgraduate	\$25,000–\$50,000	Married
P5	Female	83	NZ European	Unsure	\$0–\$25,000	Widowed
P6	Female	73	NZ European	Secondary	\$50,000–\$75,000	In a relationship
P7	Female	62	British	Tertiary	\$0–\$25,000	Separated

**Table 3.** *Participant audiometric data.*

<b>Participant ID</b>	<b>BEPTA (dB HL)</b>	<b>WEPTA (dB HL)</b>	<b>TRQ Score (0-104)</b>	<b>Tinnitus Severity (1-10)</b>
P1	16.25	22.5	16	4
P2	12.5	26.25	0	3
P3	1.25	7.5	14	2
P4	13.75	15	13	4
P5	42.5	43.75	32	8
P6	42.5	120 <sup>a</sup>	2	1
P7	10	57.5	23	4
<b>Mean</b>	19.82	41.79	14.29	3.71

*Note.* “BEPTA” represents the 4-frequency (.5, 1, 2, and 4 kHz) pure tone average of the better hearing ear. “WEPTA” represents the 4-frequency (.5, 1, 2, and 4 kHz) pure tone average of the worse hearing ear. “TRQ Score” signifies the score from the Tinnitus Reaction Questionnaire, with a higher score indicating a greater amount of tinnitus-associated distress. “Tinnitus Severity” was elicited from the demographic questionnaire, with a higher score corresponding to greater perceived tinnitus severity

<sup>a</sup>Decibel level at which there was no response.

### **3.4 Thematic Analysis of Interview Session 1**

Utilising the learner verification and revision of materials procedure described in section 1.7.1, the author and her supervisor conducted group interviews to obtain participant opinion about the brochure. The questions used in the interview were designed to elicit feedback on the topics of attraction, comprehension, self-efficacy, cultural acceptability, and persuasion.

After the meetings, the author scrutinised interview data to identify recurring themes. Eight general themes emerged, along with 16 sub-topics. Table 4 provides a summary of the

themes and sub-topics, with participants who contributed to each sub-topic listed in parentheses.

**Table 4.** *General themes and sub-topics from Interview Session 1.*

Theme	Sub-topic
Layout	Increase font size (P1, P2, P3, P4)
	Lighten the colours (P1, P2, P4)
	Maximise layout space (P1, P5, P6, P7)
Language	Avoid jargon and technical terms (P2, P4, P5, P7)
Purpose	Clarify who the intended audience is (P4, P6, P7)
	Demonstrate brochure purpose on the cover (P1, P2, P3, P4)
	Use meaningful graphics (P1, P2, P3, P4, P5, P7)
Production	Clarify who produced the brochure (P1, P4, P6)
	Provide “date of update” (P3, P4)
Amount of information	Reduce content (P2, P4)
Explain tinnitus	Expand tinnitus definition (P1, P2, P3, P4)
	Emphasise that tinnitus different for everyone (P1, P2, P3, P4, P5, P6, P7)
	Emphasise that there is no cure (P1, P4)
	Re-organise the list of causes (P1, P3, P4)
Treatment options	Provide low-cost, practical tips (P1, P2, P3, P4, P5, P6, P7)
	Explain how hearing aids can help tinnitus (P3, P5)
Contact information	A website alone is not adequate contact information (P1, P2, P3, P4, P6)

### **Theme 1: Layout**

Several participants commented on font size. Participants 2 and 3 felt that reading glasses were required to read the brochure. Participants 1 and 4 agreed, stating that the typeface was too small. Regarding the colour scheme, Participant 4 believed it was too dark and obscured the message, and other participants agreed. Participant 1 suggested that the headings be reduced in size, since they were taking up a relatively large amount of space compared to the sections beneath them.

### **Theme 2: Language**

Although *tinnitus* may be considered a technical term, all participants agreed that the word should be used in the brochure, as opposed to replacing it with common language such as “ringing in the ears”. Participants felt that a generic phrase would be too arduous to use throughout the brochure. Other jargon, however, such as “auditory habituation therapy”, was not well-received. Participant 7 said she had skipped over the phrase while reading because it was too difficult. Participant 2 said he had never heard of Meniere’s Disease. It was agreed that listing Meniere’s Disease as a cause of tinnitus is redundant information, because if an individual has Meniere’s Disease, he or she will already be familiar with tinnitus.

### **Theme 3: Purpose**

During the interview, it was apparent that participants could not clearly identify the brochure’s purpose and target audience. Participant 6 thought the brochure was trying to educate people who do not have tinnitus, and later stated that only the treatment section seemed targeted at tinnitus sufferers. Participant 4 suggested adding a question to the cover—“Do you have ringing in your ears?” to help readers identify if the brochure is relevant.

There was extended discussion about the images used in the brochure. Most participants agreed that the cover image featuring a tui was attractive, however did not see the connection between a tui and tinnitus. Some participants felt the tui should remain on the



cover since it is aesthetically pleasing; others felt the cover graphic should feature an ear to indicate the brochure's purpose. Participant 7 believed the cover should not include an ear graphic because it would be boring, since ears are commonplace among audiological brochures. She stated that if the brochure had an ear on the cover she "wouldn't pick it up because I've read it before". All participants felt there were too many tui images on the inside of the brochure, which were repetitive and overly space-consuming. Participant 4 felt that including an image of a forest would be appropriate, since his tinnitus sounds like a forest full of cicadas. Participants 7 also alluded to cicadas while discussing tinnitus.

#### **Theme 4: Production**

While discussing who produced the brochure, Participant 1 was unclear about who the producing company was. He could not discern whether they were government-owned or a private organisation. Participant 4 agreed, adding that he thought the brochure had been produced by the University of Canterbury. Participants agreed that they would like to know who the brochure was "backed by" along with credential information. There was a consensus among participants that the brochure appeared professional and modern, however there was uncertainty surrounding its publication date. Participant 4 suggested that a "date-of-update" be included—an idea that was positively received by other participants.

#### **Theme 5: Amount of information**

Participant 2 introduced the theme of surplus content by asserting that the brochure contained too much information. He suggested that more summarising would be effective, and believed that "short, big, and to the point" is the best way to communicate a message. Other participants concurred with his statements.

## **Theme 6: Explain tinnitus**

A popular topic among participants centred on the definition of and treatment for tinnitus. Several participants mentioned that their tinnitus takes on a different form than ringing, and proposed that the definition be expanded. Further, Participant 4 explained that his tinnitus is heard in his head rather than his ears. Similarly, many participants expressed that tinnitus is a difficult concept to imagine until experienced personally. All participants agreed that the brochure should emphasise that each individual may experience tinnitus in a different way.

Participants also suggested that the list of tinnitus causes be reorganised. Participant 4 contended that the most common cause of tinnitus, noise trauma, should be listed first. Others noted that medication should be mentioned as a cause as well as a treatment, and that “unknown” should be included as a cause. Another topic that emerged was the discrepancy between *treatment* and *cure* for tinnitus. Some participants found that the difference between the two concepts was not clarified by the brochure. Participant 4 stated that the words “no cure” should have greater emphasis, coupled with how tinnitus can be treated. One exception was Participant 7, who felt that the brochure does distinguish between *treatment* and *cure* given that each section is read thoroughly.

## **Theme 7: Treatment options**

All participants agreed that the brochure should provide low-cost, practical tips for managing tinnitus. Participant 1 thought that all the treatment options in the brochure seemed to have a cost involved, and was disappointed there were no suggestions for ways to manage tinnitus at home. Participant 2 shared that he does meditation and uses relaxation to help with his tinnitus. Several participants also felt that prevention should be included as a practical tip, such as wearing hearing protection in noisy situations. It was also agreed that readers should be warned against “miracle cures” online that are not backed by scientific evidence.

Two participants were suspicious of the use of hearing aids to treat tinnitus, and thought that a hearing aid may make tinnitus louder. After further discussion, it was apparent that the brochure should include a brief explanation of the link between amplification and tinnitus.

#### **Theme 8: Contact information**

Interestingly, this theme sparked many opinions from participants. Some felt that a website address is not sufficient as contact information since not everyone has a computer, while Participants 6 and 7 claimed that websites offer the best information. Participant 6 added that a phone number should be included also. Participant 3 stated that including a phone number is *essential*, to which there were no objections. Participant 1 stated that a blurb should be included for each website, so that a person may determine if the website is relevant before visiting the URL.

## CHAPTER FOUR: REVISION

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### 4.1 Overview

This chapter describes the process used to revise the tinnitus brochure. The author followed best practice guidelines for improving readability and suitability, in combination with implementing participant feedback from Interview Session 1. Throughout revision, efforts were made to preserve the original content and message of the brochure, as well as the “feel” it conveyed.

### 4.2 Use of Best Practice Guidelines

During revision, the author followed best practice guidelines discussed in section 1.7. In order to achieve appropriate readability, word and sentence length were reduced. For example, polysyllabic words were replaced with mono- and bi-syllabic words where feasible. Content was presented in a concise style, with bulleted lists replacing paragraphs. Because the sections were already written in a conversational tone, with headings in question form, no amendments were needed for the heading titles. The present tense and active voice were implemented throughout to make reading easier for the audience. The goal of these changes was to reduce the RGL of the brochure.

To achieve adequate suitability, further changes were made to the content. Jargon and technical terms were replaced with common language, and extraneous information was eliminated. Next, changes to layout were implemented. Text was laid out with increased spacing to reduce eye fatigue, and font size was increased to minimum 12-point. Headings were presented in bold text, with the background colour lightened from black to purple. To create more space for text inside the brochure, the number of tui images was reduced, while 2 new images were introduced to add meaning. First, an image of a woman covering her ears

was added to the cover. Her facial expression indicates discomfort, suggesting that an ear problem is troubling her. Second, an image of a pathway through a forest was incorporated into the inside of the brochure. The forest image may represent the sound of cicadas, which was a common tinnitus description among participants. Furthermore, the pathway may symbolise how experiencing tinnitus is a different journey for every individual, emphasised by the following text overlay: “Tinnitus is different for every person”.

To preserve the original “feel” of the brochure, the original colour scheme was maintained along with the cover image of a tui. The hearing clinic who produced the brochure frequently feature the tui in promotional materials. No changes were made to company branding information, which is featured along the bottom edge of the brochure.

### **4.3 Use of Participant Recommendations**

After identifying themes and sub-topics from Interview Session 1, the author attempted to incorporate as many suggestions as possible. Because not every participant shared the same opinion, best judgement was used when deciding which suggestions to implement. For example, opinions varied concerning the cover image: some participants endorsed an ear image, others voted for a forest, while some preferred the original image. Other suggestions, such as the inclusion of practical tips, were easier to implement due to general consensus among the group. Table 5 shows the 16 sub-topics with corresponding participant quotes, and the resulting revisions.

**Table 5.** Revisions implemented based on participant feedback.

Sub-topic	Quote	Revision
Increase font size	<i>The typeface is too small. (P4)</i> <i>I can't read this without reading glasses. (P2)</i>	Increased font size to minimum 12-point font.
Lighten the colours	<i>The dark colours make it hard to see what's there. Lighten it up to make it more inviting to read. (P4)</i> <i>The headings are so dark. (P2)</i>	Used black font on white background; changed the heading colour from black to purple.
Maximise layout space	<i>The title headings are taking up too much space compared to what goes underneath it. (P1)</i>	Reduced heading size.
Avoid jargon and technical terms	<i>The words "auditory habituation therapy" are too difficult. I skipped over those words and went straight to the description underneath. (P7)</i> <i>I've never heard of Meniere's Disease. (P5)</i> <i>If you have Meniere's, you'd already know about it and know about tinnitus. (P2)</i>	Replaced jargon with common words; removed Meniere's Disease from list of causes.
Clarify who the intended audience is	<i>But with this you're trying to educate people who don't have tinnitus? (P6)</i> <i>Only the treatment information seems targeted at tinnitus people. I find it confusing who the target is. Is it for people who are just getting it, or don't realise they have it yet? (P6)</i>	Added "Do you have ringing in your ears?" to cover; included passages in the second-person narrative.
Demonstrate brochure purpose on the cover	<i>A definition or description of tinnitus on the cover would be better. (P1)</i> <i>Put questions on cover – "Do you hear ringing in your ears?" – to help identify if the brochure is relevant. (P4)</i>	Added "Do you have ringing in your ears?" to the cover.
Use meaningful graphics	<i>Why are there so many pictures of the bird? (P5)</i> <i>Pull back on pictures of the tui and include more information. (P6)</i> <i>My tinnitus is like cicadas on the West Coast. So maybe a picture of a forest? (P4)</i>	Reduced the number of tui photos; added a photo of a forest.

Clarify who produced the brochure	<p><i>It's not clear who this company is. Is this a government organisation or private? (P1)</i></p> <p><i>I thought this brochure was produced by the university. (P4)</i></p> <p><i>It isn't clear that they provide those treatments. (P6)</i></p>	Added section explaining who the company is and what services they offer.
Provide date-of-update	<p><i>Include a "date updated" on the brochure so you know if the information is current. (P4)</i></p>	Added "date updated" to cover.
Reduce content	<p><i>Short, big, and to-the-point without getting too involved is a better way of getting the message across to everybody. (P2)</i></p> <p><i>It's possible that there's too much information. Needs more summarising. (P2)</i></p>	Replaced paragraphs with bulleted lists; removed extraneous content.
Expand tinnitus definition	<p><i>It does not state that ringing does not necessarily occur in ears. For me it occurs in the head. (P4)</i></p>	Changed tinnitus definition to "sounds in the head or ears".
Emphasise that tinnitus different for everyone	<p><i>It says to reduce loud noises, whereas I prefer noise because quiet situations are a nuisance. (P4)</i></p> <p><i>Well I prefer quiet. I hate low level humming sounds because they sound like my tinnitus. (P1)</i></p> <p><i>If they read that description, they may think they haven't got it [tinnitus]. (P1)</i></p> <p><i>It's very hard to imagine what tinnitus is like until you've got it. (P6)</i></p> <p><i>Re-word that paragraph to show that different people experience tinnitus in different ways. (P4)</i></p>	Included both "reduce loud noises" and "use a sound machine" as practical tips; added quote stating that tinnitus is a different experience for everyone.
Emphasise that there is no cure	<p><i>The large quote is a waste of time because it is repeated. Make the "no cure" part larger instead. (P1)</i></p> <p><i>The last page says "no cure" – it should have more emphasis. Use larger bolder font, coupled with how can tinnitus be treated. (P4)</i></p> <p><i>There is not a clear difference between "no cure" and "no treatment". (P5)</i></p>	Removed prevalence quote; added "There is no cure for tinnitus yet..." in large font.

Re-organise the list of causes	<p><i>It mentions medication as a treatment, but not a cause. Paracetamol can cause it. (P3)</i></p> <p><i>If it is most commonly caused by noise trauma, then that should be at the top. (P4)</i></p> <p><i>Include that the cause can be “unknown”. (P4)</i></p>	Added medication as a cause, with aspirin as an example; put “exposure to loud sounds” at top of list; added that the cause may be unknown.
Provide low-cost, practical tips	<p><i>There should be something about prevention. (P2)</i></p> <p><i>There are so many “miracle cures” online. They should warn about that! (P1)</i></p> <p><i>I don’t want to spend money; I would prefer practical tips. (P1)</i></p> <p><i>All the treatment options seem to have cost involved. (P1)</i></p> <p><i>I do meditation to help with my tinnitus. (P2)</i></p>	Added a “Practical tips” section.
Explain how hearing aids can help tinnitus	<p><i>I’m highly suspicious of getting HAs for tinnitus. How do extra sounds in the ear help with tinnitus?(P3)</i></p> <p><i>Would a hearing aid make it worse? It wouldn’t make tinnitus louder? (P5)</i></p>	Included research link between tinnitus and hearing aids.
A website alone is not adequate contact information	<p><i>Not everyone is online, so a website is not useful for people without a computer. (P6)</i></p> <p><i>A phone number is essential! (P3)</i></p> <p><i>You can’t tell if these websites are worth visiting.</i></p> <p><i>There should be a blurb explaining who they are. (P1)</i></p>	Added phone numbers alongside website addresses; added details about who the organisations are.

## 4.4 Clinician Consultation

Following completion of the above changes, the author consulted with the clinician who had provided the original brochure. A copy of the revised brochure was sent to the clinician via email along with a summary of the implemented changes. This step was taken to update the clinician on the revision process and to obtain feedback before sending the revised brochure to participants. Following correspondence from the clinician, no further changes were made to the brochure. A copy of the revised brochure is provided in Appendix H.



## CHAPTER FIVE: RESULTS

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### 5.1 Overview

This chapter presents evaluation results of the revised tinnitus brochure. The revised brochure was evaluated in terms of readability and suitability, following the same procedures used for evaluation of the original brochure. Next, participants from Interview Session 1 met a second time to provide feedback about the revised brochure at group meetings, known as Interview Session 2. The purpose of Interview Session 2 was to determine if participants endorsed the revised version of the brochure. The chapter concludes with a results summary, including results from Chapter Three.

### 5.2 Readability and Suitability Assessment

The sections below address the following hypotheses:

- a) The revised tinnitus brochure will have a readability level no greater than the sixth RGL.
- b) The revised tinnitus brochure will have a SAM score > 39%.

#### 5.2.1 Readability of revised brochure

Readability assessment revealed that the revised brochure was, on average, written below the sixth RGL. Assessment was carried out using the five formulas described in Chapter One. Table 6 provides a summary of readability analysis results for the original and revised versions of the brochure.

**Table 6.** *Readability analysis of original and revised brochures.*

Version	SMOG	FRE	F-K	Fry	FOG	Mean
Original brochure	12	57	9	11	9.8	<b>10.5</b>
Revised brochure	6.1	73.6	5	5	7.5	<b>5.9</b>

*Note.* Means do not include FRE score, which is based on a score of 1-100 rather than a RGL.

### 5.2.2 Suitability of revised brochure

The SAM score for the revised brochure was 76.25%, indicating that it falls into the *superior* category for patient education. Table 7 provides a breakdown of SAM scores for the original and revised brochures.

**Table 7.** *Suitability of Materials (SAM) for original and revised brochures.*

SAM Category	Maximum points possible	Original brochure score	Revised brochure score
Content	8	5	7
Literacy demand	10	5	6.5
Graphics	10	3	6
Layout & typography	6	2	5
Learning stimulation	6	0	4
Cultural appropriateness	2	1	2
<b>Total</b>	<b>42</b>	<b>16</b>	<b>30.5</b>
<i>Percent score</i>	<i>100%</i>	<i>38.09%</i>	<i>76.25%</i>

## 5.3 Feedback from Interview Session 2

This section addresses the following hypothesis:

- c) Participants will indicate the revised brochure does not require further revision.

The author and her supervisor held a second round of group interviews, known as Interview Session 2, to obtain participant opinion about the revised brochure. Interview Session 2 followed the same interview scheduled used in Interview Session 1. Due to scheduling conflicts, group assignment differed from Interview Session 1. For Interview Session 2, Participants 1, 3, and 5 comprised the first group while Participants 2, 4, and 7 comprised the second group. Participant 6 participated in a telephone interview.

Participants offered fewer comments during Interview Session 2 than Interview Session 1, so the supervising researcher highlighted examples of revision to prompt additional feedback. Once Interview Session 2 was complete, the author reviewed interview data to determine if participants endorsed the revised brochure and to identify suggestions for further improvement. Overall, participants were satisfied with the revised brochure and indicated that no major changes were necessary.

The first topic of discussion was the revised brochure's cover. Participants thought that the brochure's purpose was clarified by changes made to the cover. Participant 1 felt that the addition of the question "Do you have ringing in your ears" helps engage the audience. Participant 3 agreed, adding that the question is beneficial for people who are unfamiliar with the word "tinnitus". During the telephone interview, Participant 6 stated that including the question in the cover "makes it clearer what it's [the brochure] about". Participant 3 suggested that the phrase "ringing *or noises*" be used in the question, since some people do not experience tinnitus as ringing.

Participants endorsed the new image showing a woman clutching her ears in distress. Participant 1 believed that the image gives "a human face to tinnitus", and was pleased that the image was not "stereotyped with an older male". Participant 4 felt there was a good contrast between "the happy bird and the feeling above it" and that the combination of images "does make you want to pick it up". Similarly, Participants 2 and 7 commented that the

original image of the tui was attractive, while the additional image and question help indicate what the brochure is about. When asked her opinion about the new image, Participant 6 responded, “That’s a picture of ringing in the ears.” Participant 5 felt that the new image draws attention to the fact that the brochure has something to do with hearing. Some participants asked about the watermark on the image, and it was explained that the image had not been purchased and the watermark would not appear if the image were used in production.

All participants endorsed the date-of-update added to the cover. Participant 6 explained, “I think it is helpful because these brochures can sit around a long time and it does give you an idea how current it is.”

The next topic concerned the new layout. Participant 6 said that the brochure “has brightened up a bit” and would be “a bit quicker for someone to pick up”. The increased font size and use of white space were generally well-received by participants. Participants were pleased that reading glasses would not be required when looking at the brochure and that the layout was no longer “cluttered”. One participant (Participant 4) felt that the revised brochure had become too bare inside because “the white space with black print is less interesting”. He stated that, “In this day and age when graphics tend to be funky, it might not be eye-catching.” In contrast, Participant 2 preferred the new layout, and Participants 1 and 3 felt that the use of white space made the brochure much easier to read. Participant 1 said, “It’s good to have bigger text but still with white space around. It’s more pleasant to read overall and not as dense as the other one.”

In general, participants endorsed the new forest image in place of the original tui images. Participant 1 felt the forest image was adequately placed to “give depth and break up flow”, and the path in the bush made him think of insect sounds. Participant 7 expressed that the image may be interpreted as either “a dark valley because you’re depressed” or “a walk through the forest because you’re happy”. This sparked discussion around the meaning of the

image and the quote, whereby the author expressed that the path in the image may correlate with the overlaid quote (Tinnitus is different for every person), implying that suffering from tinnitus is an individual journey. The author also stated that a forest of cicadas may represent the sound of tinnitus. Participants reacted favourably to the explanation. For example, Participant 2 said, “I like the message itself in the middle there. People think it’s ringing in the ears, full stop; but there’s a lot of variation and the message is that it’s different for everybody.” Participant 1 commented that it was effective to include the image while still utilising white space, otherwise “it would be boring with no picture on inside”. When asked about the image, Participant 6 said, “I think it brings a bit of colour to it, but it’s a bit too dark. Lighter would be possibly better.”

The discussion then turned to comprehension. Several participants were pleased that the words “auditory habituation therapy” were omitted from the brochure. Participant 2 felt the content was “straightforward” and that the reader could “get a good idea if you want to do something about it [tinnitus]”. Participant 4 said there was “nothing there now that people wouldn’t understand” and Participant 7 added, “It’s very clear”.

Many participants commented on the use of bulleted lists in place of paragraphs. Participant 5 felt that the material was “straight to the point and laid out well” and that “bullet points are better than paragraphs, otherwise people get bored with waffling on and lose interest.” Similarly, Participant 7 stated, “The bullet points are good because it makes it really clear.” In a final example, Participant 6 said, “The bullet points make it easier to read. It does sort of say the same thing, doesn’t it—but it’s easier to read. You can read it a lot quicker and more clearly.”

The next discussion topic centred on tinnitus management. Overall, participants found the Practical Tips section was helpful, and many participants shared which tips they could relate to or found most useful. For example, Participant 7 commented, “I like that last one—

be aware of miracle cures—it's good that it's not leading you on." Compared to the original brochure, Participant 6 said, "This is better than before because it has more information." The supervising researcher drew attention to the new quote, "There is no cure for tinnitus yet, but there are treatments that can help you cope with it", to elicit commentary. She noted that the revised brochure emphasises that there is no cure for tinnitus, and asked participants if they felt something could be done to help with tinnitus. Participants responded that they felt they could do something about their tinnitus. Participant 1 thought the word "strategies" would be a more appropriate term than "treatments" in the quote, because the word "treatment" implies that cost may be involved. Participant 1 also proposed including a tip instructing when someone should consult a doctor about tinnitus, a comment which other participants concurred with.

All participants felt the revised brochure clarified who had produced it and who the intended audience was. Participant 1 commented, "The other one sounded like an ad for the company; this one doesn't. It has a more altruistic feel to it." Participant 4, however, thought that some readers may still be suspicious of the producer. He suggested that some might think, "Oh, here's a private company with something to sell. Are they really reputable people who can help us?" He wanted to know if the clinic was accredited and recognised by health services. Participant 4 asked, "Who actually vouches for this? Is it a reliable source or some commercial outfit?" Further discussion ensued as to whether the information in the brochure had been verified.

Next, participants were asked about alterations made to the For More Information section. All the participants felt the additional information added to the website addresses was helpful. Participants 2 and 4 were pleased to know that some of the organisations were non-profit or volunteer-based.

The last topic addressed cultural appropriateness. Everyone agreed that there was nothing present in the brochure that would cause offense to a reader. The researchers asked if the brochure was over-simplified or patronising, and none of the participants felt it was. Participant 6 remarked, “It’s not too simple, because it does tell you where to get more information, and it’s quick and easy to read. So there is nothing demeaning about it.”

In closing, researchers elicited any general comments from participants. Overall, participants endorsed the revised brochure and felt that no major changes were necessary. Participants’ concluding comments are cited in Table 8 below.

**Table 8.** *Participants’ final comments regarding the revised brochure.*

Participant ID	Quote
P1	<i>It looks really nice. It is informative without overloading the senses. It’s easy to remember certain things. I like the added warning about miracle cures on the Internet.</i>
P2	<i>I can’t find any fault with it. Big, clear, and the message is there.</i>
P3	<i>Yes, it’s good. It tells you where to go for information.</i>
P4	<i>What about consulting a graphic design specialist? You might get some useful tips from someone who is in advertising. As far as the information is concerned, there is a good balance now. The layout and graphics—it’s coming across considerably better.</i>
P5	<i>It explains the whole thing briefly and quite well. I think it’s done well as far as my brain is concerned. I think everyone thought it was successful.</i>
P6	<i>I think it probably deals with the questions we had in the first place. Certainly a lot easier to read, as a brochure should be. You should be able to read with lots of stuff going on around you, whereas the other one with small print you would have to take it home to absorb it. This one you can take in in one hit.</i>
P7	<i>I think it’s great.</i>

## 5.4 Further Revision

Based on participant feedback from Interview Session 2, no major changes were required for the revised brochure. However, the author decided to implement five minor changes as suggested by participants, resulting in a final version of the revised brochure (Appendix K). These changes are outlined in Table 9. One other suggestion, that the brochure should include a reference to the New Zealand Audiological Society (NZAS), could not be implemented due to restrictive guidelines. According to NZAS guidelines, there must not be any general statements associating a clinic with the NZAS (NZAS, 2015).

**Table 9.** *Final changes to the revised brochure based on participants' suggestions.*

Participant suggestion	Revision
Add “or noises” to cover question.	Changed cover question to: “Do you have ringing or noises in your ears?”
Add the word “group” after “non-profit” under the For More Information section.	Updated description to read “A non-profit group that helps...”
Include a tip for when to see a doctor in the Practical Tips section.	Added “See your doctor if your tinnitus came on suddenly or is very bothersome” under Practical Tips.
Show that the information in the brochure has been verified.	Added the statement: “The information in this brochure has been approved and verified by the University of Canterbury”.
Replace the word “treatments” with “strategies”.	Updated the quote to: “There is no cure for tinnitus yet, but there are strategies that can help you cope with it”.



## 5.5 Results Summary

This section provides a combined summary of results from Chapters Three and Five.

Chapter Three addressed the following research questions:

- a) What is the RGL of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?
- b) What is the suitability of a tinnitus information brochure that is provided to tinnitus patients at an audiology clinic?

Evaluation through readability and suitability analysis showed that the original version of the tinnitus brochure was written above the recommend fifth to sixth grade reading level and was considered *not suitable* for patient education. In light of these results, the brochure underwent revision with the aim of improving the brochure.

The following hypotheses addressed the aim of revising the tinnitus brochure:

- a) The revised tinnitus brochure will have a readability level no greater than the sixth RGL.
- b) The revised tinnitus brochure will have a SAM score  $> 39\%$ .
- c) The participants will indicate the revised brochure does not require further revision.

The revised brochure was, on average, written below the sixth RGL, with a mean RGL of 5.9. SAM results yielded a score of 76.25%, indicating that the revised brochure meets the requirement for a *superior* category rating. Overall, participants indicated that the revised brochure showed improvement over the original version and was deemed appropriate for the target audience. A few minor changes were made to the revised brochure, resulting in a final version of the revised brochure, provided in Appendix K.

## CHAPTER SIX: DISCUSSION

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### 6.1 Introduction

The first aim of this thesis was to evaluate a tinnitus brochure. The brochure underwent readability and suitability analysis using standardised measures, and was then evaluated using learner verification, whereby a group of participants with tinnitus were interviewed about the brochure. The second aim of this thesis was to revise the brochure to achieve adequate readability and suitability, taking into account participants' opinions.

During the evaluation phase, readability and suitability analysis results indicated that the brochure was difficult to read and not suitable for the intended audience. Participant feedback indicated that the brochure could be improved. The brochure underwent revision following best practice guidelines and taking into account participants' opinions. The revised brochure showed improvement in terms of readability and suitability, and was endorsed by participants. These findings are reviewed below in relation to the literature, followed by a discussion of the study's implications. The final section addresses the study's limitations and suggestions for future research.

### 6.2 Readability

The first research question of this thesis queried the RGL of a tinnitus brochure. Readability analysis using five formulas indicated that the tinnitus brochure was written above the recommended fifth to sixth RGL (National Library of Medicine, 2013). Readability results from SMOG, F-K, Fry, and Fog revealed that the RGL of the brochure ranged from 9 to 12, while a FRE score of 57 indicated that it is fairly difficult to read. These findings are in agreement with other studies that assessed readability of audiology materials. For example, Joubert and Githinji (2014) evaluated 21 informational pamphlets on paediatric hearing loss

and found that the average readability level was higher than the recommended reading level. Joubert and Githinji used SMOG to evaluate readability and reported that most of the pamphlets were estimated to have a sixth to seventh RGL, with a range of 4<sup>th</sup> to 10<sup>th</sup> grade. Although these scores may seem better than expected, the recommended RGL in South Africa is fourth grade, indicating that the pamphlets should be revised to achieve adequate readability (Auta, Shalkur, Dayom, & Banwat, 2011, as cited in Joubert & Githinji, 2014).

In a recent thesis, Logan (2015) assessed the readability of two tinnitus brochures. Logan used the same five readability formulas that were employed in the present study, and found that the mean RGL of both brochures was 10<sup>th</sup> to 11<sup>th</sup> grade. Similarly, the mean RGL determined by the present study was 10.5. Doak and colleagues (1996) recommend that revision be undertaken if a material's RGL is above the 9<sup>th</sup>-grade level, and the process for improving readability need not be arduous. Logan (2015) demonstrated that a tinnitus brochure can successfully be revised to improve readability using simple tactics such as reducing sentence length and replacing complex words with simple ones. Logan did not redesign and rewrite the brochures in her study, and suggested that future researchers undertake this task and use SAM analysis and learner verification to evaluate the revised material, which supports the aims of the present study.

The present study serves as another example of how achievable it is to improve readability by reducing sentence length and replacing polysyllabic words with simple terms. The first hypothesis of the present study predicted that the revised tinnitus brochure would have a readability level no greater than the sixth RGL. The revised brochure achieved a mean RGL of 5.9, supporting the hypothesis. Because the FRE score is based on a score of 1-100 rather than a RGL, that result should be considered individually. The FRE score of the revised brochure was 73.6, which shows improved readability over the original brochure's score of 57. Another result that warrants discussion is the FOG score. The revised brochure received

an estimated RGL of 7.5 using FOG, which is above the recommended RGL. Recall that FOG estimates the RGL required for 90% comprehension of a text, which lies between the comprehension levels used in SMOG (100%) and FRE/F-K (75%). Interestingly, the revised brochure was rated at the sixth RGL by SMOG. This inconsistency demonstrates the importance of using several formulas. Furthermore, readability is only one piece of the evaluation puzzle. Motivation and prior knowledge of the material are unaccounted for by readability formulas (Friedman & Hoffman-Goetz, 2006; Kong & Hu, 2015), as are layout, syntax, font size, and use of images (Doak et al., 1996; Kong & Hu, 2015).

### **6.3 Suitability**

The second research question posed by this thesis examined the suitability of the original brochure. The brochure received a SAM score of 16 out of 42 or 38.09%, deeming it *not suitable* for patient education. This result was unsurprising, as research has consistently shown that patient education materials could be improved in terms of suitability. In a revealing study within the field of audiology, Caposecco et al. (2014) used SAM to evaluate hearing aid user guides. Their findings indicated that all 36 of the user guides could be improved in terms of suitability. Many of the user guides shared common weaknesses, including aspects of layout and typography. Caposecco and colleagues reported that most of the user guides exhibited low contrast between text and paper and the font size was too small. In terms of literacy demand, the user guides frequently used uncommon words and jargon, while the reading level was rated *not suitable* in 69% of the user guides. These SAM results are similar to the SAM results for the original tinnitus brochure. In their study, Caposecco and colleagues provided suggestions for improvement, such as using common words where possible, ensuring adequate white space is present, using black text on a white background, and using a larger font size. Many of the suggestions provided by Caposecco et al. were employed when revising the original tinnitus brochure.

Further studies looking at suitability of audiology materials are limited in the existing literature. To help expand on this, Potter (2015) investigated the readability, quality, and suitability of online hearing-related healthcare materials available to New Zealand consumers. Potter found that, overall, suitability levels of online materials were lower than optimal. However, the common areas of weakness differed from findings in the present study. Potter reported that, on average, SAM factors with the highest ratings were Graphics, Layout and Typography, and Content (specifically, *Purpose*). In contrast, these factors were among the lowest rated in the present study. This disparity may be accounted for by the inherent differences between print and online media. Websites can be updated regularly to ensure they are current, whereas updating printed material incurs a heftier expense burden due to printing costs. Furthermore, there is greater flexibility with typography and graphics design on a webpage due to the nature of screen display, versus the type of layout possible with a printed brochure. For example, layout is limited to the confines of the brochure's physical size, whereas a website may accommodate numerous graphics and present content in a more fluid manner due to the reader being able to scroll down the webpage. In addition, colours and graphics appear more vibrant on a computer screen than in print, and allow for greater contrast. These attributes could potentially lead to a higher score for the Graphics and Layout and Typography factors. Another aspect affecting layout is how content can be arranged in categories under clickable headings on a website, allowing for a superior organisation of content than can be achieved with a brochure. Finally, differences between the researcher's aims may account for conflicting SAM scores. Specifically, one of Potter's goals was to investigate the suitability of Internet health materials concerning hearing impairment for New Zealand consumers. The websites in the study were assessed using a relatively broad objective in comparison to the tinnitus brochure, which was assessed in terms of a specific goal for a target audience.

Following the revision process, it was hypothesised that the revised tinnitus brochure would have a SAM score greater than 39%. The revised brochure received a SAM score of 76.25%, a score which supported the hypothesis and placed the brochure into the *superior* category.

## **6.4 Participant feedback**

Participant feedback from Interview Session 1 indicated that the original brochure could be improved. As discussed in Chapter 3, the author identified eight themes based on participants' suggestions, including "layout", "language", "purpose", "production", "amount of information", "explain tinnitus", "treatment options", and "contact information". These themes and their sub-topics were as expected based on readability and suitability analysis results, as many of the suggestions aligned with best practice guidelines for improving readability and suitability. For instance, suggestions to avoid jargon/technical terms and reduce content will lead to improved readability. Suggestions to increase font size, demonstrate the brochure's purpose on the cover, and use meaningful graphics will help improve suitability.

Considering participant feedback was helpful during the revision process as working with specific suggestions provided direction for the author. However, it was important to consider which changes to implement, because some suggestions may have been of the minority opinion or were beyond the scope of the brochure. According to Doak et al. (1996), deciding which changes to implement should be based on three criteria: 1) the importance of incorrect responses based on the material's purpose, 2) how many respondents answered incorrectly, and 3) cultural acceptance and self-efficacy responses (p. 183).

Based on participants' responses, it was clear that the brochure's purpose was unclear, so clarifying purpose was a priority during revision. To achieve this, an image and question were added to the cover. Doak et al.'s second criterion was also useful during revision,

because it was important to consider how many participants felt that a particular change should be implemented. For example, one participant felt that there should not be an ear-related image on the cover, because she thought it was too frequently used on audiology brochures. Other participants, however, felt an ear image would be useful. It was decided to add an ear-related image (woman clutching her ears) to the cover because it would satisfy the majority's opinion and would help readers identify the brochure's purpose. Finally, the third criterion – cultural acceptance and self-efficacy responses – helped stipulate which changes to include. A brochure that is considered offensive to its audience would defeat its purpose, but fortunately none of the participants deemed the brochure to be offensive in any way. Yet the brochure was found lacking in its ability to instil self-efficacy in its readers. Based on the brochure's content, many participants felt that the only option for treating tinnitus was to purchase a product or service. As a result, incorporating a list of low-cost strategies that can be done at home was another priority during revision.

The third and final hypothesis of this thesis predicted that participants would indicate that the revised brochure did not require further revision. As hypothesised, participants endorsed the revised brochure. While there were minor suggestions that could also have been implemented, overall, participants indicated that the revised brochure did not require any further changes.

Examples of successful document revision using learner verification are present in the literature, although the amount of research is limited, especially within audiology. In their 2011 study, Jones and colleagues adapted a hypertension recommendations pamphlet for an Indo-Asian audience. The original English-language pamphlet underwent readability assessment and revision, resulting in the RGL being reduced from the ninth- to the sixth grade level. The revised pamphlet was then reviewed by five members of the Indo-Asian community using the learner verification and revision interview procedure to verify

suitability. The revised pamphlet was then translated into four Indo-Asian languages and re-assessed by the same five participants to re-assess suitability, with a particular focus on cultural appropriateness. This study demonstrates the importance of involving the target audience in the revision process. The researchers implemented changes that have been recurrently discussed in this thesis, such as removing technical language, reducing word count, and increasing font size. Interestingly, the researchers learned that the original pamphlet was not culturally appropriate due to lifestyle advice, so the pamphlet was edited to include culturally appropriate food items that should be limited. This shortcoming may not have been discovered using readability and suitability assessment alone. Similarly, in the present study, involving participants who experience tinnitus shed light on key features that warranted inclusion in the tinnitus brochure. The interview process revealed that participants wanted low-cost strategies, and allowed for discussion where participants shared their personal coping strategies, which led to the development of the “Practical Tips” section

A similar study by Vadaparampil and Pal (2010) also highlights the importance of soliciting feedback from the target audience during the revision process. Vadaparampil and Pal sought to revise a brochure used to promote participation in a population-based study. The target audience was African American women with a history of early-onset breast cancer. As a result of pilot testing the brochure on the target audience, the researchers learned that women in the study preferred the term *Black* over *African American* to describe their community. This type of feedback is vital to ensure that the language used in the brochure is culturally appropriate and will attract members of the target audience. In the present study, participants indicated that they prefer use of the word *tinnitus* despite it being a technical term. Participants felt that it was appropriate to use the term throughout the brochure because individuals who suffer from tinnitus will likely be familiar with the term before picking up the brochure. To avoid excluding those who are not familiar with the word *tinnitus*, the question



“Do you have ringing in your ears?” was included in the cover to help define the term without needing to open the brochure.

Results from the learner verification process in the Vadaparampil and Pal (2010) study further highlight the importance of assessing revised material with the same audience a second time. As with the present study, Vadaparampil and Pal started with an original brochure, created a revised version, then made further changes resulting in a final version. In the original and revised versions of the breast cancer study brochure, there was no information about who was conducting the study; after the revised brochure was re-reviewed, a section titled “Who are we?” was added to the final version. Furthermore, participants indicated that the revised brochure achieved three of the five verification elements (comprehension, self-efficacy, and persuasion) while the remaining two (attraction and cultural acceptability) needed further improvement. This emphasises the importance of soliciting participant feedback after the initial revision process is complete. In the present study, meeting with participants a second time was invaluable not only for confirming that the revised brochure was satisfactory, but also for learning if further changes could be incorporated into the final version of the brochure.

A worthwhile comparison can be made between participant feedback and expert opinions (as measured by SAM) for the original tinnitus brochure. The SAM raters scored the original brochure 3 out of 10 points for Graphics, mainly because the cover image did not demonstrate the brochure’s purpose and some of the images lacked relevance. Participant feedback closely matched the SAM score, image meaning was a major discussion point among participants. Likewise, participant feedback closely aligned with SAM scores for the Literacy Demand and Layout and Typography factors. While revision may have been undertaken based on SAM scores alone, participant feedback provided specific points to help guide the process. The SAM raters scored the original brochure 0 out of 6 points for Learning

Stimulation and Motivation. The Learning Stimulation and Motivation factor is scored on three criteria: 1) Use of questions/problems for reader responses, 2) Instruction models specific behaviours, and 3) Subdivision of complex topics into small parts. With a score of 0 for this topic, it would be challenging for the author to know how where to start revision. Fortunately, since participants were involved, the author had clear instruction for incorporating a “Practical Tips” section. Using SAM alone, it is unlikely that the author would have thought to add the section, which was indeed a high priority according to participants.

## **6.5 Clinical Implications**

This study has shown that a tinnitus brochure can successfully be revised and improved. The findings might serve as a message to clinicians that many materials are unsuitable for their patients, but materials can be made more readable and suitable by following best practice guidelines. Readability formulas can easily be used online, and clinicians can do a quick SAM check after a bit of practice. When revising printed information, it is important for clinicians to focus on keeping the message simple. The majority of content should take the form of bulleted lists rather than paragraph form, and superfluous information should be removed. As illustrated above, the ideal scenario would incorporate patient feedback to guide revision and confirm that changes were satisfactory prior to finalisation.

Ensuring patient understanding extends beyond printed education materials. It is essential that clinicians’ verbal communication is considerate of and accommodating toward patients. Clinicians and other health professionals should pay careful attention to their word choice to ensure they are using appropriate and understandable language. For instance, clinicians should speak slowly and avoid jargon (Benyon, 2014; Rudd, 2010). Otherwise, patients may not understand key points of the message or may feel intimidated, which would

not foster a comfortable learning environment for patients. Research has shown that most patients will be too embarrassed to admit when they have not understood what was said (Ad Hoc Committee on Health Literacy, 1999; Parker, 2000). In order to receive adequate care, patients must not feel embarrassed to ask questions or to request a repeat of information. Non-verbal communication also carries considerable meaning, so clinicians should be mindful of their body language and attitude during appointments. According to Benyon (2014), it is imperative that clinicians exhibit an approachable and encouraging demeanour toward patients (Benyon, 2014). Clinicians can implement strategies immediately by consciously adapting their communication style to their patients' needs. Clinicians may also wish to write down a list of the key points covered during an appointment for the patient to refer to later.

For clinicians who help tinnitus patients, it is important to be aware that patients prefer simple strategies they can implement on their own with little cost. As mentioned in Chapter One, Tunkel and colleagues (2014) recommend that clinicians educate patients about tinnitus management strategies. During the interview sessions, some participants felt that their only treatment option was to purchase a product or service. The implications of this feedback are that clinicians should make an effort to offer a wide range of treatment options along with low-cost strategies that can be employed at home. It is also beneficial for clinicians to place a greater emphasis on tinnitus awareness, as many participants did not realise how common tinnitus was among the general population. According to Mazurek et al. (2015), a better understanding of tinnitus can help reduce stress and anxiety about the condition, which in turn may help reduce tinnitus.

Because tinnitus is a relatively widespread condition for which many people will seek information, it is important that clinicians provide high quality information on the topic. According to Hoffman and Worrall (2004), printed materials must be noticed, read,

understood, believed, and remembered in order to be effective. As exemplified in the present study, many printed materials are not suitable for their intended population. There must be a call to action among health professionals to assess and improve patient education materials. Because well-designed materials can improve patient self-management (Rudd, 2010), it is hoped that findings from the present study will inspire the re-design of existing materials that will help tinnitus sufferers learn about and manage their condition.

## **6.6 Limitations and Future Research**

The present study was subject to several limitations, which must be addressed. Firstly, the sample size was smaller than desired. The author had anticipated that 10 tinnitus sufferers would participate in the study, a sample size recommended by Doak et al. (1996) for the learner verification and revision of materials procedure. Due to withdrawals (discussed in Chapter Two), a total of seven participants completed the study. Because the participants were meeting in groups, it was not possible to recruit new participants without rescheduling the entire group. Therefore, it was deemed more favourable to continue the study with fewer participants than to attempt to reschedule the group, which could have inconvenienced existing participants and potentially led to more withdrawals. Furthermore, recruiting one or two more participants would essentially mean recruiting up to five more participants in order to constitute a full group. Due to the present study being a master's thesis with time constraints, recruiting additional participants was not a feasible option.

To maximise participant numbers, future researchers may wish to arrange group meetings with a fewer individuals so that meetings can be more easily rescheduled if necessary and more participants may be recruited in the event of withdrawals. A disadvantage of this approach would be that a small group may lose the dynamics present with a larger group. It was evident during the interview sessions that participants were feeding off each other's ideas and were more inclined to express their opinions after hearing others share their

experiences. One incident of lost group dynamics occurred in the present study. Because one participant could not attend Interview Session 2, she was interviewed via telephone. Although the participant provided valuable feedback during the interview, it is likely that her responses would have been different had she been in a group environment, with the opportunity to be inspired by or contend with others' opinions.

Another limitation related to group dynamics is that participants were mixed among groups during the interview sessions. In other words, group assignment differed from Interview Session 1 to Interview Session 2. This may be seen as a limitation because the study was less controlled than it could have been with conditions being kept the same for the interview sessions. The reason for mixing the groups was simply for scheduling ease, which was a recurring challenge during data collection. It is possible to see an advantage of mixing participant groups, with more opportunity for diverse interactions as participants were introduced to new people.

Further to sampling and scheduling limitations, there were other shortcomings that could be improved. A considerable limitation was that researcher bias may have influenced the author's interpretation of interview data. A solution for future researchers may be that a second researcher independently analyses interview data for themes and the two researchers compare their results. It should be noted, however, that the supervising researcher was present during the interview sessions and would have noticed any major discrepancies reported by the author. A related limitation may be the author's presence during the interviews. Because participants were aware that it was the author who revised the brochure, they may have been reluctant to express negative opinions about the revision while the author was present. In the future, this could be avoided by appointing another researcher to help conduct interviews, so the revising researcher is not present during interview sessions.

Following Interview Session 1, the author endeavoured to implement as many suggestions as possible, however it was not feasible to make every change desired. For example, it was recommended that the author consult a graphic designer to ensure the revised brochure maintained a professional quality. Despite being a valid point, it was not financially viable to execute such a recommendation. The author explained to participants that the primary focus of revision was on content rather than aesthetics.

Finally, because a final version of the brochure was created following minor changes to the revised brochure, it would have been advantageous to administer a third run of readability and suitability analyses. This would allow the author ensure that the final brochure still met readability and suitability standards. Due to time constraints and because the final brochure received only minimal alterations, it was deemed unnecessary to run a third set of analyses.

## **6.7 Conclusion**

This study aimed to evaluate a tinnitus information brochure using readability and suitability assessment in combination with participant feedback. Results confirmed that the brochure did not have adequate readability or suitability, indicating that the brochure could be improved. These findings were in agreement with existing research findings. Brochure revision using best practice guidelines while implementing participant feedback resulted in the revised brochure achieving adequate readability and suitability for the intended audience.

This study highlights the importance of providing tinnitus sufferers with information that is easily understood, has clear purpose, and offers low-cost strategies. When tinnitus patients are given high-quality information about tinnitus, they have a better chance at improved health outcomes. This study proves that it is possible to improve materials by following a simple step-by-step process. It is hoped that clinicians will be motivated to assess the materials they provide to patients and engage in revision if feasible; and to be mindful of

their language and demeanour during appointments to ensure that patients understand key information and do not feel intimidated. Utilising these recommendations could potentially lead to improved health outcomes for tinnitus patients.

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APPENDIX A: TINNITUS BROCHURE

**Social Support**

People often misunderstand the frustrations that can come with Tinnitus. Sufferers need understanding. So how can family and friends help?

- Reduce loud noises at home, in the workplace or at social gatherings
- Understand why Tinnitus sufferers may want to avoid noisy situations
- Find ways to reduce stress levels

**Some of the most frequently reported sounds are roaring (like an ocean), clicking, buzzing, hissing and crickets.**

*giving back life!*

**For more information**  
For more information about tinnitus visit our website [www.hearingtech.co.nz](http://www.hearingtech.co.nz)

**or the following websites...**

New Zealand Tinnitus Support Network:  
[www.tinnitus.org.nz](http://www.tinnitus.org.nz)

New Zealand Hearing Association:  
[www.hearing.org.nz](http://www.hearing.org.nz)

Tinnitus Research Initiative:  
[www.tinnitusresearch.org](http://www.tinnitusresearch.org)

**0800 142 152**  
[www.hearingtech.co.nz](http://www.hearingtech.co.nz)

**Tinnitus**

**hearing technology**

PROUDLY NEW ZEALAND OWNED AND OPERATED



## What is Tinnitus?

Tinnitus (ringing in the ears) is the perception of sound within the human ear when no actual sound is present. Some of the most frequently reported sounds are roaring (like an ocean), clicking, buzzing, hissing and crickets. It may be soft or loud, high or low pitched. Tinnitus is common and affects about 15-20% of all adult New Zealanders.

## How does Tinnitus become a problem?

Some people find their Tinnitus does not go away, or it gets worse. In some cases it may become so severe that they find it difficult to hear, concentrate or even sleep.

Sleep deprivation due to Tinnitus can make it difficult to function throughout the day and can indirectly affect the ability to communicate with others. This can cause negative emotions such as frustration, anger and discouragement. Recent research has shown that some people suffer from anxiety and depression because of Tinnitus.

There is no cure for Tinnitus yet but there are treatments that can help many people cope better with the condition.

## How can Tinnitus be treated?

The appropriate treatment option depends on the severity of the Tinnitus and the way in which it affects the lifestyle of the individual. No medications have yet been proven to be effective in clinical trials at this stage. Some treatment options include:

- **Auditory Habituation Therapy** attempts to retrain the brain to remove the awareness of Tinnitus from the consciousness. This breaks the habit of associating Tinnitus with anxiety or distress. Just as someone living next to a railway track will tune out the sound of passing trains, so the brain can be trained to "tune out" Tinnitus.
- **Counselling** programs have an educational component to explain what goes on in the brain that causes Tinnitus. They are designed to help change the way sufferers think about and react to Tinnitus.
- **Wearable sound generators** are small electronic devices that fit in the ear and emit soft pleasant sounds. Their aim is to introduce constant low level sounds which blend in with the Tinnitus sounds to help camouflage the annoying or distressing effects.
- **Hearing aids** are often helpful for people who have a hearing loss as well as Tinnitus. Using a hearing aid adjusted to carefully control outside sound levels may make it easier to hear and may make Tinnitus less noticeable.

## What causes Tinnitus?

Many things can cause Tinnitus including exposure to loud noise and some medications. In many cases no obvious cause is found. Tinnitus is not a disease but a problem in the hearing pathway or in the central nervous system of the brain.

### Some other possible causes include:

- Head, noise or psychological trauma
- Ear and sinus infections
- Diseases of the heart or blood vessels
- Meniere's disease
- Hearing Loss



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WWW.HEARINGTECH.CO.NZ

## APPENDIX B: RECRUITMENT FLYER



### DO YOU SUFFER FROM TINNITUS? WE NEED YOUR HELP!

Between 15-20% of New Zealanders suffer from tinnitus. It's important to give tinnitus sufferers information that's useful for them and is understandable.

We're looking for people who suffer from tinnitus to give us their opinions about an informational brochure about tinnitus.

We'll ask you to read the brochure and to give us your opinions about it. Then, we'll revise the brochure and again ask your opinions about it again.

Contact us for more information.

We need people who are:

- ✓ Aged 18 and over
- ✓ Suffering from tinnitus
- ✓ Able to read and carry on a conversation in English

You will receive:

- ✓ a free hearing check.
- ✓ a \$20 petrol voucher

Rebecca Kelly- Campbell  
03 364 2987 x 8327  
jrb166@ucdive.ac.nz

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03 364 2987 x 8327  
jrb166@ucdive.ac.nz

## APPENDIX C: INFORMATION SHEET

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### Research Information Sheet

**Study Title:** *Evaluation of a Tinnitus Brochure*

**Researchers:**

Jenna Baker  
Master of Audiology student  
Email: jrb166@uclive.ac.nz

Dr Rebecca Kelly-Campbell  
Research supervisor  
Email: rebecca.kelly@canterbury.ac.nz

Dept of Communication Disorders  
University of Canterbury  
Phone: (03) 364 2987 ext 8327

**Why am I invited to be in this study?**

You are invited to take part in the study: *Evaluation of a Tinnitus Brochure*. We've invited you to participate in this study because we believe that you will be able to give a valuable perspective about the study focus.

**What is the aim of the study?**

We want to get people's opinions of a brochure for tinnitus: if it needs to be improved and if so, how we could improve it.

**Who do we need for the study?**

We need adults who suffer from tinnitus. It is also important that you are able to travel to the University of Canterbury and can converse in English.

**What will happen in the study?**

If you agree to be in this study, you'll be asked to fill in an information sheet telling us about yourself and your feelings about your tinnitus. You'll also be asked to look over an information brochure about tinnitus. You'll be interviewed twice in a group setting.

One of the researchers will contact you to arrange the first interview. There will be 5 people participating in the group interview. We'll ask you about your opinions of the brochure, if it could be improved to better meet the needs of people with tinnitus, and if so, how it could be

improved. Everyone in the group will get a chance to share his/her opinions. The interview will take about an hour.

Then, we'll revise the brochure and send it to you to look over. We'll contact you for the second group interview, which will be run in the same way as the first interview. We'll ask you the same questions about the revised brochure: your opinion of it, if it could be improved, and if so, how it could be improved.

You will receive a hearing check at no charge, which will take about 15 minutes. The hearing check will be done at the same session as the first group interview. The hearing check will be administered by one of the researchers at the University of Canterbury Speech and Hearing Clinic. You will be asked to press a button every time you hear a beep through a pair of headphones. The beeps are used to find the quietest sounds you can hear at different pitches. You will get the result of the hearing check in person immediately following the test. The hearing check is required for participation in the study.

You will receive a \$20 petrol voucher for participating in the study.

### **What are your rights?**

You do not have to take part in the study – it is entirely up to you. You can withdraw from the study at any time, without giving a reason. This will NOT affect any future interactions you have with the University of Canterbury. If you do withdraw, we will remove all information relating to you, as long as you let us know before the first interview session. After that time, we will not be able to remove the information you've already given because it will not be practical to do so.

### **What are the benefits of the study?**

There are no direct benefits to you. But, we hope this study will help us provide better information about tinnitus to people who suffer from tinnitus.

### **What are the risks of the study?**

There are no direct risks for you being in this study. But, you may feel distressed talking about your tinnitus. You may have whanau or a friend present to help you deal with any distress. You may also feel distressed if a hearing loss is identified with the hearing check. You will find a list of support services at the bottom of this letter.

### **Will your information stay private?**

The results of the study may be published, but your identity will be kept private throughout the study. Information you give us will not be anonymous, but no information that could identify you will be used in any reports in the study. Only the researchers listed at the top of this letter will see any information we collect.

We will keep the data in a locked filing cabinet and in a password-protected computer. We will destroy the data five years after we finish the study.

This study is part of Jenna's Master of Audiology thesis. A thesis is a public document and will be available through the UC Library.

**How do you find out about the study findings?**

Please tick the box on the consent form if you want to know the study results.

**Has this study been approved?**

The study has been checked and approved by the University of Canterbury Human Ethics Committee. If you have a problem or complaint about this research, contact: The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz (03) 364 2987 ext 45588).

**What do you do next?**

If you agree to take part in this study, please contact the researchers:

Email: jrb166@uclive.ac.nz

Phone: (03) 364 2987 ext 8327

Thank you for taking time to read about this study.

**Who can you contact if you feel distressed?**

Lifeline: 0800 543 354

**Who can you contact if you want more information about tinnitus and hearing loss?**

Hearing Technology: 0800 142 132

New Zealand Audiological Society: 0800 625 166

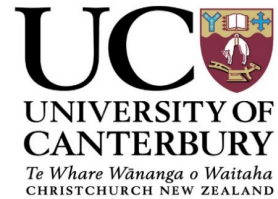
Ministry of Health Healthline: 0800 611 116

Ministry of Health Disability Support: 0800 373 664



## APPENDIX D: CONSENT FORM

---



### CONSENT FORM (Please keep this copy for your records)

Study title: *Evaluation of a Tinnitus Brochure*

The information about this research study has been explained to me to my satisfaction. I have had the chance to ask questions. I know what I need to do to take part in the study.

I know that I can choose whether or not I take part in this research.

I know that I may withdraw from the study until the first group interview session, without penalty. If I withdraw, my information will also be withdrawn.

I know that I must respect the confidentiality of other participants in the study. I know that I must not share any information from the group interviews with anyone outside the group.

I know that any information or opinions I give will be kept private to the researchers and other members of the focus group. I know that any published or reported results will not identify me. I know that a thesis is a public document and will be available through the UC Library.

I know that all data collected for the study will be kept in locked and secure facilities or in password protected computers and will be destroyed after five years.

I will be given a copy of this form and the Research Information Sheet. I know that I can contact the researchers for more information. They are:

Jenna Baker: [jrb166@uclive.ac.nz](mailto:jrb166@uclive.ac.nz)

Dr Rebecca Kelly-Campbell: [rebecca.kelly@canterbury.ac.nz](mailto:rebecca.kelly@canterbury.ac.nz), (03) 364 2987 ext 8327

If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch ([human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz), (03) 364 2987 ext 45588).

Consents:

I would like a copy of the final results of the study.

Yes ☐ No ☐

I would like a copy of my interview notes.

Yes ☐ No ☐

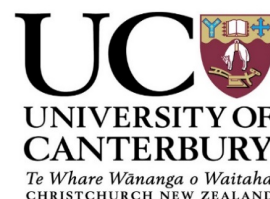
By signing below, I agree to take part in this research project.

Name (please print): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX E: DEMOGRAPHIC QUESTIONNAIRE

---



### Participant Information

*Please answer each question honestly and to the best of your ability*

Date: \_\_\_\_\_ Current age: \_\_\_\_\_ Gender: \_\_\_\_\_

1. What ethnic group(s) do you belong to?

- |   |                                  |
|---|----------------------------------|
| <input type="checkbox"/> New Zealand European                                     | <input type="checkbox"/> Tongan  |
| <input type="checkbox"/> Maori  | <input type="checkbox"/> Niuean  |
| <input type="checkbox"/> Samoan   | <input type="checkbox"/> Chinese |
| <input type="checkbox"/> Cook Island Maori  | <input type="checkbox"/> Indian  |
| <input type="checkbox"/> Other, such as Dutch, Japanese, Tokelauan. Please state: |                                  |

\_\_\_\_\_

2. What is your relationship status? (please tick one box)

- |                                    |  |
|------------------------------------|--|
| <input type="checkbox"/> Single    | <input type="checkbox"/> Never married               |
| <input type="checkbox"/> Married   | <input type="checkbox"/> In a committed relationship |
| <input type="checkbox"/> Widowed   | <input type="checkbox"/> Divorced                    |
| <input type="checkbox"/> Separated |  |

3. What is the net annual income of your household? (please tick one box)

- |  |   |
|--|---|
| <input type="checkbox"/> \$0 – \$25,000      | <input type="checkbox"/> \$25,000 - \$50,000  |
| <input type="checkbox"/> \$50,000 - \$75,000 | <input type="checkbox"/> \$75,000 - \$100,000 |
| <input type="checkbox"/> more than \$100,000 |   |

4. What is the highest level of education you completed? \_\_\_\_\_

5. On a scale of 1 to 10, how would you describe the severity of your tinnitus?

1	2	3	4	5	6	7	8	9	10
Not very severe				Severe		Very severe			

6. Have you ever received treatment for your tinnitus?

☐ Yes ☐ No

a. If yes, please state the treatment option(s) \_\_\_\_\_  
\_\_\_\_\_

7. Do you have hearing impairment?

☐ Yes ☐ No

8. Do you wear hearing aids?

☐ Yes ☐ No

# APPENDIX F: TINNITUS REACTION QUESTIONNAIRE

**For Patient**

## Tinnitus Reaction Questionnaire (TRQ)

Name

Date Completed:

This questionnaire is designed to find out what sort of effects tinnitus has had on your lifestyle, general well-being, etc. Some of the effects below may apply to you, some may not. Please answer **all** questions by circling the number that **best** reflects how your tinnitus has affected you **over the past week**.

	Not at all	A little of the time	Some of the time	A good deal of the time	Almost all of the time
1. My tinnitus has made me unhappy.	0	1	2	3	4
2. My tinnitus has made me feel tense.	0	1	2	3	4
3. My tinnitus has made me feel irritable.	0	1	2	3	4
4. My tinnitus has made me feel angry.	0	1	2	3	4
5. My tinnitus has led me to cry.	0	1	2	3	4
6. My tinnitus has led me to avoid quiet situations.	0	1	2	3	4
7. My tinnitus has made me feel less interested in going out.	0	1	2	3	4
8. My tinnitus has made me feel depressed.	0	1	2	3	4
9. My tinnitus has made me feel annoyed.	0	1	2	3	4
10. My tinnitus has made me feel confused.	0	1	2	3	4
11. My tinnitus has "driven me crazy".	0	1	2	3	4
12. My tinnitus has interfered with my enjoyment of life.	0	1	2	3	4
13. My tinnitus has made it hard for me to concentrate.	0	1	2	3	4
14. My tinnitus has made it hard for me to relax.	0	1	2	3	4
15. My tinnitus has made me feel distressed.	0	1	2	3	4
16. My tinnitus has made me feel helpless.	0	1	2	3	4
17. My tinnitus has made me feel frustrated with things.	0	1	2	3	4
18. My tinnitus has interfered with my ability to work.	0	1	2	3	4
19. My tinnitus has led me to despair.	0	1	2	3	4
20. My tinnitus has led me to avoid noisy situations.	0	1	2	3	4
21. My tinnitus has led me to avoid social situations.	0	1	2	3	4
22. My tinnitus has made me feel hopeless about the future.	0	1	2	3	4
23. My tinnitus has interfered with my sleep.	0	1	2	3	4
24. My tinnitus has led me to think about suicide.	0	1	2	3	4
25. My tinnitus has made me feel panicky.	0	1	2	3	4
26. My tinnitus has made me feel tormented.	0	1	2	3	4
Total					

Wilson et al. 1991

## APPENDIX G: INTERVIEW SCHEDULE

---

### Interviewer introduction:

Thank you all for coming in today to talk with me about the tinnitus brochure that you read. The purpose of this session is to get your opinion of the tinnitus brochure. Over the next hour or so, I'm going to ask you some questions about the brochure. There are no right or wrong answers.

After today's session, I'll use your feedback to revise the tinnitus brochure. In a few weeks, we'll send out the revised brochure for you to look at. Then we'll meet here again to discuss your opinions of the revised brochure.

Each of you has kindly volunteered your time and expertise for this project. We appreciate your help and ask that you respect each other's confidentiality. Please do not share information about today's session with anyone outside the group.

Because everyone here experiences tinnitus, please speak loudly and clearly so everyone can hear. I ask that you try not to talk over other people. Everyone will get a chance to share opinions. You may disagree with others' opinions, and that's okay. I want to hear what everyone has to say.

Are there any questions before we begin?

### **Topic 1: Attraction**

In this part of the interview, I want to find out how well the brochure attracts your attention. If you can, please use your brochures to give me some specific examples.

1. What do you think about the cover? How well was it able to attract your attention?
2. How engaging is the brochure?
3. What do you think of the colours used in the brochure? What are your thoughts on how the colours fit the mood of the brochure's purpose?

### **Topic 2: Comprehension**

For this part, I want to get your opinion about how well the brochure helped you understand the content. Again, give me some specific examples if you can.

4. Which words in the brochure, if any, do you think are difficult to understand?

5. What do the pictures tell you?

6. Which pictures, if any, do you find not helpful or confusing?

7. What pictures should have been included in the brochure?

8. What is tinnitus?

9. How common is tinnitus?

10. What are some possible causes of tinnitus?

11. How can tinnitus become a problem?

12. What are some treatments for tinnitus?

### **Topic 3: Self-efficacy**

Now I'd like to get your opinion about how well the brochure helped you feel you could manage your tinnitus.

13. After reading the brochure, how confident do you feel that you could manage your tinnitus?

14. What treatment options are available to you?

15. Do you feel you have enough information to talk with family and friends about what they can do to help you manage your tinnitus? If not, what other information is needed?

16. How can you get more information about tinnitus?

### **Topic 4: Cultural appropriateness**

For this this last topic, I'd like to get your opinions about the cultural appropriateness of the tinnitus brochure.

17. Which parts of the brochure, if any, do you feel could cause offense?

18. Which parts of the brochure, if any, do not seem true or genuine?

19. Which parts of the brochure, if any, do you find annoying?

20. What else should have been included in the brochure?

### **Conclusion**

What else would you like to say about the tinnitus brochure?

Thank you all for your time and opinions. We'll send you a copy of the notes relating to your part of the interview if you indicated you wanted them.



APPENDIX H: REVISED BROCHURE

### Practical tips

- Reduce loud noises if they make your tinnitus worse.
- If being in quiet makes your tinnitus worse, try playing soft music. A sound machine can play nature or ocean sounds.
- Stress can make tinnitus worse. If you feel stressed, try yoga, meditation, or go for a walk.
- Wear ear plugs in loud places to protect your ears from noise.
- Beware of "miracle cures" on the Internet. No drugs have been shown to help with tinnitus yet.

### For more information

#### NZ Tinnitus Support Network

Support and counselling services for people with tinnitus  
[www.tinnitus.org.nz](http://www.tinnitus.org.nz)  
09 923 6316

#### NZ Hearing Association

A volunteer group that helps people with any type of hearing problem  
[www.hearing.org.nz](http://www.hearing.org.nz)  
0800 233 445

#### Tinnitus Research Initiative

A non-profit that helps find tinnitus treatments (based in Germany)  
[www.tinnitusresearch.org](http://www.tinnitusresearch.org)  
+49 941 941 209

### About Hearing Technology

A locally owned hearing clinic that offers:

- Hearing help
- Hearing aid services
- Tinnitus help

**0800 142 152**  
[www.hearingtech.co.nz](http://www.hearingtech.co.nz)



### Do you have ringing in your ears?



# Tinnitus



PROUDLY NEW ZEALAND OWNED AND OPERATED  
Updated 9/2015


*giving back life!*

## What is tinnitus?

- Tinnitus is hearing sounds in the head or ears when no real sound is there.
- It may sound like roaring (the ocean), clicking, buzzing, hissing, or cicadas.
- It may be soft or loud, high or low pitched.
- Tinnitus is not a disease, but a problem in the hearing pathway or brain.

## What causes tinnitus?

- Loud sounds
- Hearing loss
- Some drugs, such as aspirin
- Head injury
- Ear and sinus infections
- Heart disease
- Often the cause is not known



Tinnitus is  
different for  
every person

## How does tinnitus become a problem?

- Sometimes, tinnitus does not go away, or it gets worse.
- Tinnitus may make it hard to hear, think, or sleep.
- Losing sleep due to tinnitus can make you tired during the day.
- Tinnitus can make it hard to hear people talking. This may lead to feelings of anger or sadness.
- Research shows that some people have anxiety or depression because of tinnitus.

## How can tinnitus be treated?

- Therapy can help you learn to "tune out" tinnitus. For example, someone living by a railway track can learn to tune out the sound of passing trains.
- Counselling can help change the way you think about and react to tinnitus.
- Tiny sound makers can be worn in the ear. They play soft, pleasant sounds to help hide tinnitus.

- Hearing aids may help people who have tinnitus and hearing loss. Research shows that almost 70% of people do not notice their tinnitus as much while wearing hearing aids.

There is no cure for tinnitus yet, but there are treatments that can help you cope with it



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## APPENDIX I: ETHICS APPROVAL

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### HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen  
Email: [human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz)

Ref: HEC 2015/31

13 May 2015

Jenna Baker  
Department of Communication Disorders  
UNIVERSITY OF CANTERBURY

Dear Jenna

The Human Ethics Committee advises that your research proposal "Evaluation of a tinnitus brochure" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 8 May 2015.

Best wishes for your project.

Yours sincerely

A handwritten signature in black ink, appearing to read 'L. MacDonald'.

Lindsey MacDonald  
**Chair**  
*University of Canterbury Human Ethics Committee*

## APPENDIX J: LETTER FROM MĀORI RESEARCH ADVISORY GROUP

---

### Māori Research Advisory Group Consultation Response

May 7<sup>th</sup> 2015

Tēnā koe, Jenna

Re: Evaluation of a Tinnitus Brochure

This letter is written on behalf of the Māori Research Advisory Group (MRAG). It acknowledges that your proposal has been reviewed by MRAG. I am pleased to advise you that we are satisfied that you have given appropriate consideration to the cultural aspects of your research, and have thought about the potential impact and relevance of your research for Māori communities.

Thank you for engaging with the Māori consultation process. This will strengthen your research proposal, support the University's Strategy for Māori Development, and increase the likelihood of success with external funding applications. It will also increase the likelihood that the outcomes of your research will be of benefit to Māori communities. We wish you all the best with your current project and look forward to hearing about future research plans.

The MRAG committee would appreciate a summary of your findings on completion of the current project. Please feel free to contact me if you have any further questions.

Nāku noa, nā



Dr Tracy Rohan

**Research Consultant Māori**

**Research and Innovation**

Room 244, Level 2, Psychology Building  
ext 45520

Email: [tracy.rohan@canterbury.ac.nz](mailto:tracy.rohan@canterbury.ac.nz)

Office Hours: Wednesdays 12.30- 5.00 pm, Thursdays and Fridays 8.00am to 4.30 pm



APPENDIX K: FINAL BROCHURE

### Practical tips

- Reduce loud noises if they make your tinnitus worse.
- If being in quiet makes your tinnitus worse, try playing soft music. A sound machine can play nature or ocean sounds.
- Stress can make tinnitus worse. If you feel stressed, try yoga, meditation, or go for a walk.
- Wear ear plugs in loud places to protect your ears from noise.
- Beware of "miracle cures" on the Internet. No drugs have been shown to help with tinnitus yet.
- See your doctor if your tinnitus came on suddenly or is very bothersome.

### For more information

#### NZ Tinnitus Support Network

Support and counselling services for people with tinnitus  
[www.tinnitus.org.nz](http://www.tinnitus.org.nz)  
09 923 6316

#### NZ Hearing Association

A volunteer group that helps people with any type of hearing problem  
[www.hearing.org.nz](http://www.hearing.org.nz)  
0800 233 445

#### Tinnitus Research Initiative

A non-profit group that helps find tinnitus treatments (based in Germany)  
[www.tinnitusresearch.org](http://www.tinnitusresearch.org)  
+49 941 941 209

### About Hearing Technology

A locally owned hearing clinic that offers:

- Hearing help
- Hearing aid services
- Tinnitus help

### Tinnitus is common and affects about 15-20% of adult New Zealanders



### giving back life!



### Do you have ringing or noises in your ears?



### Tinnitus



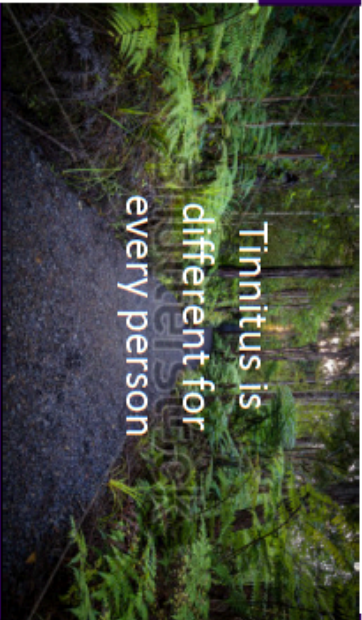
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Updated 9/2015

## What is tinnitus?

- Tinnitus is hearing sounds in the head or ears when no real sound is there.
- It may sound like roaring (the ocean), clicking, buzzing, hissing, or cicadas.
- It may be soft or loud, high or low pitched.
- Tinnitus is not a disease, but a problem in the hearing pathway or brain.

## What causes tinnitus?

- Loud sounds
- Hearing loss
- Some drugs, such as aspirin
- Head injury
- Ear and sinus infections
- Heart disease
- Often the cause is not known



Tinnitus is  
different for  
every person

## How does tinnitus become a problem?

- Sometimes, tinnitus does not go away, or it gets worse.
- Tinnitus may make it hard to hear, think, or sleep.
- Losing sleep due to tinnitus can make you tired during the day.
- Tinnitus can make it hard to hear people talking. This may lead to feelings of anger or sadness.
- Research shows that some people have anxiety or depression because of tinnitus.

## How can tinnitus be treated?

- Therapy can help you learn to “tune out” tinnitus. For example, someone living by a railway track can learn to tune out the sound of passing trains.
- Counselling can help change the way you think about and react to tinnitus.
- Tiny sound makers can be worn in the ear. They play soft, pleasant sounds to help hide tinnitus.

- Hearing aids may help people who have tinnitus and hearing loss. Research shows that almost 70% of people do not notice their tinnitus as much while wearing hearing aids.

There is no cure for tinnitus yet, but there are strategies that can help you cope with it

The information in this brochure has been approved and verified by the University of Canterbury



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